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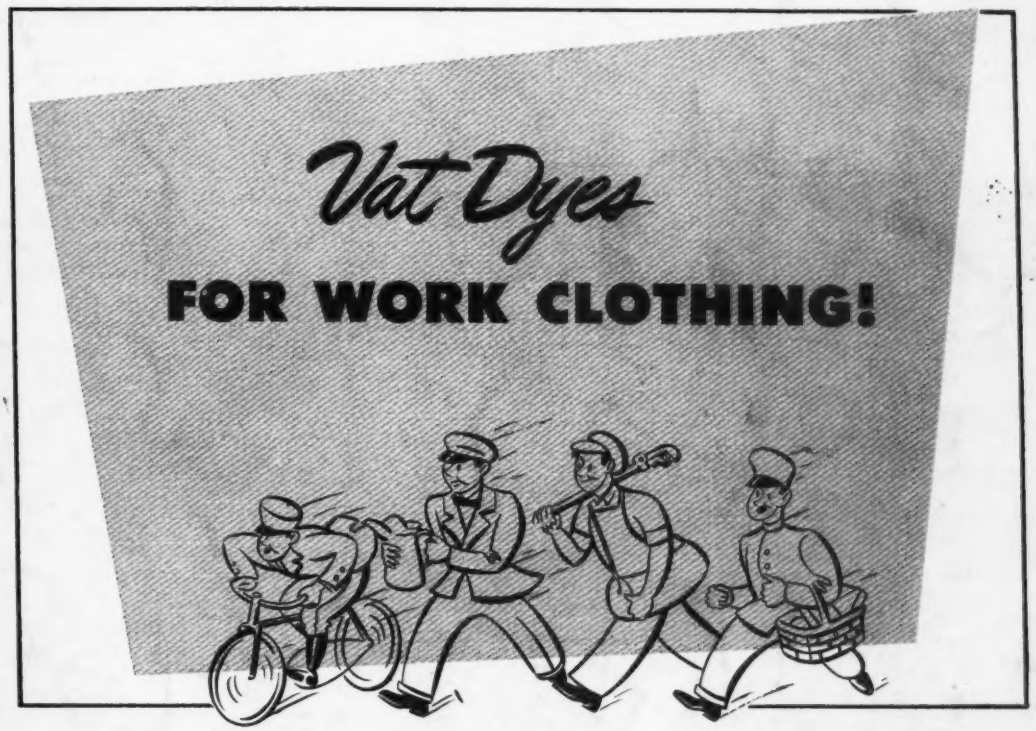
VOLUME 30, No. 15

AMERICAN DYESTUFF REPORTER

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS



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Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

JULY 21, 1941

VOLUME 30 NUMBER 15

American Dyestuff Reporter, Vol. 30, No. 15, July 21, 1941. Published every other Monday. Copyright, 1941, by Howes Publishing Co., 440 4th Ave., New York, N. Y. Domestic subscription, $5.00, Canadian, $6.00, Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

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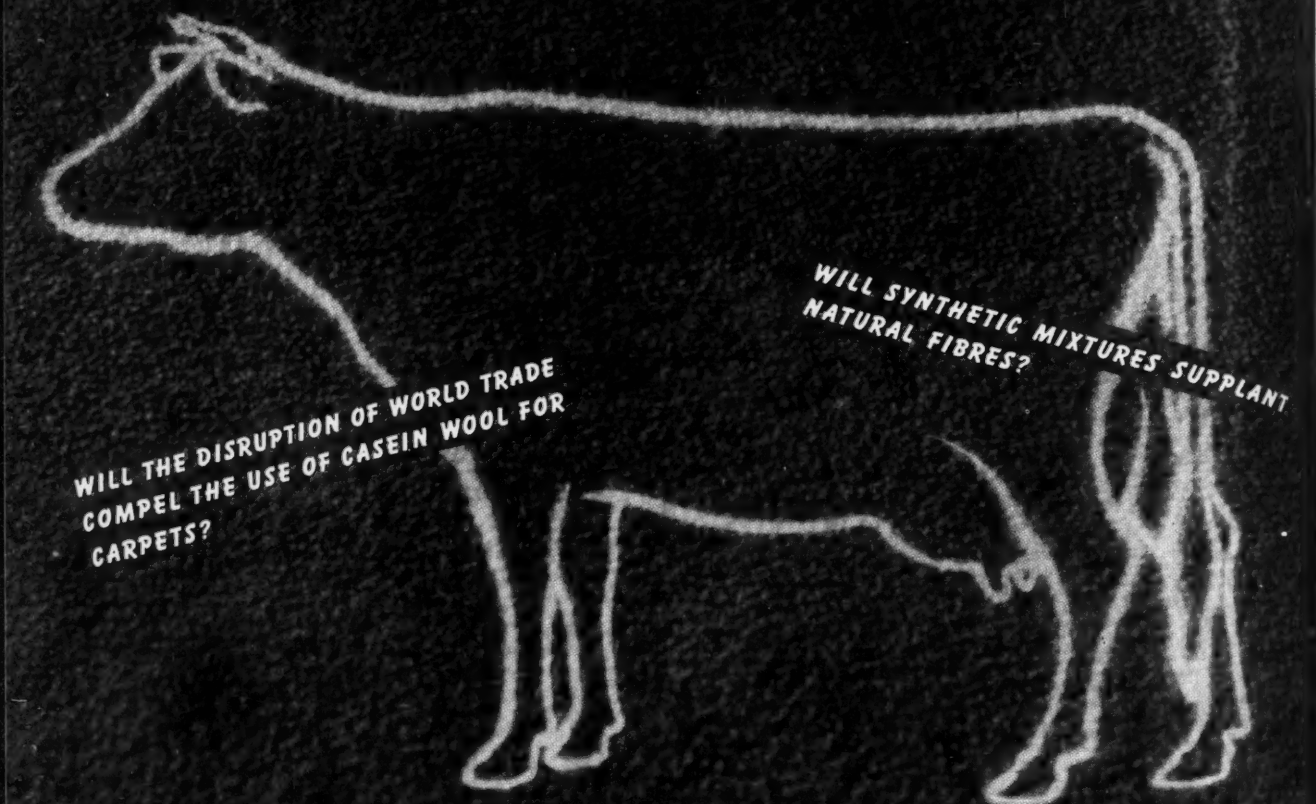
Will CARPETS *come from* COWS ?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AMERICAN
DYESTUFF REPORTER

VOLUME 30 JULY 21, 1941 NUMBER 15

FATS AND WAXES IN DISGUISE

for Application to Textiles

An Account of Some Special Auxiliaries for Making Textile Materials Soft and Water Repellent, and for Increasing the Fastness of Dyes

W. C. HUNTER-TURNER
Manchester, England

ONE of the most significant features of textile processing during the past ten years is the large number of textile auxiliaries which have been introduced and their widespread use. It would seem that organic chemistry has been pressed into service to discover new compounds so that the textile processor may the better and more easily modify yarns and fabrics in those directions where the natural fibers are lacking. Yet after reviewing all the new auxiliaries and comparing them with those used previously one cannot but notice how little we have progressed while travelling so far. Repeatedly we find on examining the composition of these auxiliaries how much alike they are as regards their basic constitution to the textile assistants formerly used. The fact is that oils, fats, and waxes still remain the textile processor's most valuable assistants—yet in disguise.

At one time it was customary to use these fatty substances directly for the treatment of textile materials, say for waterproofing, softening, and mordanting, as well as for facilitating dyeing and finishing operations. Where they could not be applied in water-soluble form (as in a soap) they were used in the form of an aqueous emulsion. Most practical dyers remember the usual instruction to use Marseilles soap, while the finisher will recall the valuable softening assistant he had in olive oil emulsions.

At a later date there appeared similar fatty substances slightly modified by sulfonation and it is not difficult to recall the introduction of Turkey red oil (sulfonated castor oil) and the more highly sulfonated product, Monopole soap. These and similar products represented attempts to make oils and fats water-soluble so that they could be more easily applied to textile materials; they enabled textile processors to by-pass the fatty emulsions which often lacked stability and were in most instances tedious to prepare. Furthermore, these sulfonated products had a reasonable stability to hard water—a great advantage when water-softening had not reached its present day state of perfection.

But so far the main use of such fatty products was that of facilitating dyeing and for softening in finishing. None of them had appreciable substantive properties towards the textile fibers to which they were applied. It is at this stage that organic chemists have come forward and used the fatty substances to prepare quite new substances which have a much wider application to textiles but which at the same time utilize those valuable properties of these oils, fats, and waxes which have been known so long. These "old-model" assistants have now been reconditioned and brought up-to-date so as to be much more useful than formerly. Since it is useful as well as interesting to trace these changes and note the various new disguises of the old fatty products in the new auxiliaries some attempt will be now made to do this. At the same time this will be an opportunity to review the principal types of new auxiliaries and their various relationships to each other.

In considering these various auxiliaries it is useful to point out that they are applicable by a variety of methods which in turn are determined by whether or not the auxiliary has an affinity for the fiber to which it is applied. Substantivity has always been an important property since this allows the auxiliary to be applied from dilute liquors and yet with economy for the liquor can be exhausted. It remains an important property, but in connection with rayon is somewhat less so for the practice is gradually developing of adding suitable substances to the spinning solution employed. By this practice (it is now much used for adding coloring matters so as to spin directly a colored rayon) it becomes possible to incorporate in the rayon filaments auxiliaries which have limited solubility; these would be difficult to apply to the fully formed rayon afterwards, but because of their insolubility are the more firmly fixed in the rayon when applied by addition to the spinning solution.

As previously pointed out, almost all the fatty assistants formerly used lacked substantive power but they certainly

all lacked ability to combine chemically with textile fibers. It is an important feature of some of the new auxiliaries having a fatty basis that they do unite with the cellulose or protein fiber to which they are applied and so are able to produce modifications of the properties of the textile material which are quite permanent so as to resist the detergent and solvent action of many of the cleaning agents used in laundries. But all these points will be noted in dealing with the auxiliaries themselves.

Before considering the numerous auxiliaries containing fat or waxy residues it will be as well to outline briefly the chief substances which find employment by the auxiliary manufacturer. Oils and fats are much the same in composition since they are usually glycerides; waxes differ from these in being esters of fatty acids.

Oils and fats such as olive oil, tallow, cotton seed oil, butter, etc., are glycerides in which a fatty acid such as palmitic, oleic, or stearic acid is combined with the trihydric alcohol, glycerine. On saponification, the liberated fatty acid can be separated and obtained in a fairly pure condition. The waxes such as spermaceti and carnauba are esters in which a high molecular weight alcohol such as cetyl or ceryl alcohol is combined with a fatty acid such as palmitic or myristic acid. On saponification both the alcohol and the fatty acid can be separated.

From the foregoing it is evident that oils, fats, and waxes are compounds from which there can be isolated fairly easily a variety of fatty acids and fatty alcohols; it is these which are of importance in the manufacture of the special auxiliaries about to be described. The fatty acids are mainly of two types according as they are saturated or unsaturated and thus have the general formulae: $C_nH_{2n+1}COOH$ or $C_n H_{2n-1}COOH$ in which n is fairly high, say 10 to 18. For example, palmitic and lauric acids (saturated) have the formulae: $C_{15}H_{31}COOH$ and $C_{11}H_{23}COOH$ respectively, while oleic acid (unsaturated) has the formula: $C_{17}H_{33}COOH$. The fatty alcohols are usually saturated and have the general formula; $C_nH_{2n+1}OH$ in which n is again high and may vary from from 10 to 20. For example, cetyl and stearyl alcohols have the formulae: $C_{16}H_{33}OH$ and $C_{18}H_{37}OH$ respectively.

In recent years special hydrogenation methods have been developed by which a fatty acid can be reduced by hydrogen in the presence of a metal such as nickel so as to form the corresponding fatty alcohol. Thus palmitic acid can be reduced to cetyl alcohol (sometimes termed hexadecyl alcohol) as shown by the following equation:

$$C_{15}H_{31}COOH + 4\,H = C_{16}H_{33}OH + H_2O$$

Palmitic acid Hydrogen Cetyl-alcohol Water

This method for producing fatty alcohols from the corresponding fatty acids is now very much used as the basis for the manufacture of fatty alcohol sulfonates (soap substitutes) but we are not concerned with these here. The important point is that using natural oils, fats, and waxes as a starting point it is easy to make from them the corresponding fatty alcohols either by splitting the fat and isolating the fatty alcohol or by also isolating the fatty acid and reducing this to the fatty alcohol.

It is often the case that the natural fatty substance consists of a mixture of substances which when split yields mixtures of two or more fatty acids and alcohols. In this case it is not always necessary to separate each substance in a pure state but the mixture can be used either before or after hydrogenation; the resulting auxiliaries are then mixtures of similar compounds but since these will have similar properties it does not detract from their value. The mixed products obtainable from sperm oil are an example of this.

As will be seen later, the following are the chief fatty acids and alcohols (together with their formulae) which find use for the production of textile auxiliaries.

Fatty acid	*Formula*	*Hydrocarbon*
Caprylic acid	$C_7H_{15}COOH$	Octane
Lauric acid	$C_{11}H_{23}COOH$	Dododecane
Palmitic acid	$C_{15}H_{31}COOH$	Hexadecane
Oleic acid	$C_{17}H_{33}COOH$	Heptadecane
Stearic acid	$C_{17}H_{35}COOH$	Octodecane
Fatty alcohol	*Formula*	
Octyl alcohol	$C_8H_{17}OH$	Octane
Decyl alcohol	$C_{10}H_{21}OH$	Decane
Dodecyl alcohol	$C_{12}H_{25}OH$	Dododecane
Cetyl alcohol	$C_{16}H_{33}OH$	Hexadecane
Stearyl alcohol	$C_{18}H_{37}OH$	Octodecane
Eicosyl alcohol	$C_{20}H_{41}OH$	Eicosane

With the foregoing facts in mind it is now convenient to consider the auxiliaries in detail and for this purpose it is most suitable to group these together according to their action on the textile material to which they are most commonly applied or according to their action when used to facilitate other treatments.

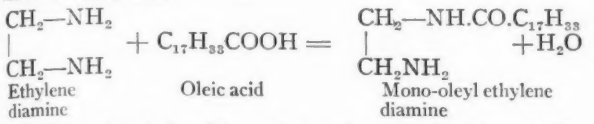
SOFTENERS

Since the main use of fats and waxes has always been that of softening textile materials we will consider this aspect first. A well known range of softening agents are known as Sapamines (S.C.I. Basel). They are applicable to all fibers and have good substantive properties towards wool on which fiber their softening effect is fast to several washings. These softening agents are especially interesting on account of their chemical composition and also when it is remembered that they were first introduced for use in dressing leather—their usefulness for textiles was not discovered until later.

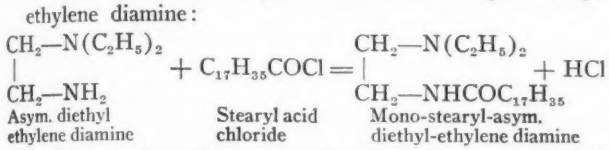
The Sapamines are based on asym. diethylethylene diamine, a product which had hitherto not found much use in the manufacture of textile auxiliaries. But it has the valuable property of being capable of combination with fatty acids, particularly oleic acid, to form substances which are softening agents but which can also be further converted into water-soluble quaternary ammonium compounds of even greater utility.

The manufacture of these auxiliaries is carried out by condensing the fatty acid (say, oleic acid) with the diamine in an autoclave for several hours. For example, when 25 parts of oleic acid and 10 parts of ethylene diamine (not the diethyl derivative) are reacted together at 180 to 200° C. for about 6 hours there is obtained a

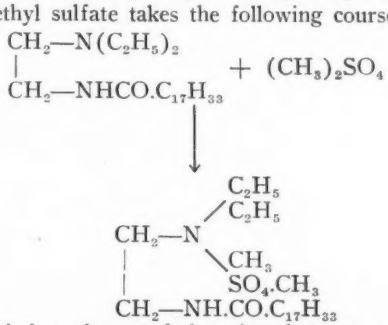
butter-like product from which mono-oleyl ethylene diamine formed thus



can be extracted with acetone; by evaporation of the acetone there is left a residue which dissolves in water to yield a strongly alkaline solution. An alternative method of preparation is that of condensing the fatty acid chloride with the diamine and the course of this reaction is shown below for stearyl acid chloride and asym. diethyl ethylene diamine:



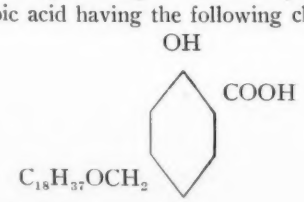
One of the advantages of using the asym. diethyl derivative of ethylene diamine instead of ethylene diamine itself is that by further treatment of the oleyl or stearyl condensation product with benzyl chloride or dimethyl sulfate it becomes possible to make quaternary ammonium compounds which are cation-active. For example, the treatment of mono-oleyl asym. diethyl ethylene diamine with dimethyl sulfate takes the following course:



in which it is to be noted that the nitrogen atom is now penta-valent. It is probable that Sapamine KW has the constitution indicated above.

While derivatives of ethylene diamine seem to be most useful in enabling oleic and stearic acids to be brought into the form of softening agents there are other basic compounds which can be used. Of these, ortho-phenylene diamine is very similar to ethylene diamine and has been found to yield products not only suitable for softening but also of value in dyeing wool.

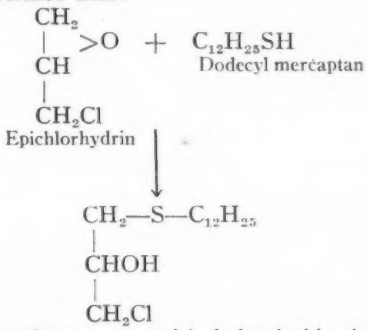
Softening agents may also be made by uniting a fatty alcohol such as stearyl or other similar alcohol which contains a chain of at least ten carbon atoms, to an ortho-hydroxy-carboxylic acid of the benzene series by means of an oxymethyl linkage. 5-octadecyl-oxymethyl-2-hydroxybenzoic acid having the following chemical structure



illustrates this type of softener. It is a bright yellow powder and is made by heating together 27 parts of stearyl alcohol and 25 parts of 5-chloromethyl-2-hydroxybenzene-1-carboxylic acid in 100 parts of chlorobenzene (as diluent).

It is very interesting to note that if ethyl or methyl alcohol is used instead of the higher molecular weight stearyl alcohol then similar products can be obtained but these have none of the desired wetting and softening properties. The fact that the group joined to the benzene ring has a high molecular weight comparable to that of an alcohol derived from a natural fat or wax is important. Furthermore, it is essential that the alcohol residue shall be united to the benzene ring through an oxymethyl group; if the linkage is direct to the benzene ring then the products (even if the alcohol residue is of high molecular weight) has not the substantive properties of the softening agents described above. This oxymethyl linkage also plays an important part in certain waterproofing auxiliaries and these will be referred to later.

An ether or thio-ether type of softening agent can be made from fatty alcohols (these should not contain less than eight carbon atoms) and 1:2-propylene oxides which are substituted in the methyl group by a halogen, hydroxyl, or mercapto group. It is thus possible to use epichlorhydrin, epibromhydrin, glycide, and thioglycide, and the ether formation may be assisted by the presence of such catalysts as sulfuric acid or boric acid. Thus an oily product having softening properties is made by heating together for several hours on a waterbath a mixture of 4 parts of dodecyl alcohol, 1 part of epichlorhydrin, and 0.1 part of concentrated sulfuric acid. This product is an oxyether but if the dodecyl alcohol is replaced by the corresponding dodecyl mercaptan then the corresponding thioether is formed thus:



This (γ-chlor-β-oxy-*n*-propyl-)-dodecyl thioether is also an oily product which can be purified by fractional distillation in vacuo.

Thioethers of a somewhat different composition can also be produced from fatty alcohols by quite another method. These newer products have considerable wetting out power in addition to being softeners. Their method of manufacture is that of reacting fatty alcohol derivatives containing an exchangeable halogen atom with salts of thio-sulfuric acid. The products are thus really organic thiosulfates.

Starting from dodecyl alcohol the method of preparation is as follows. Firstly this alcohol is converted into

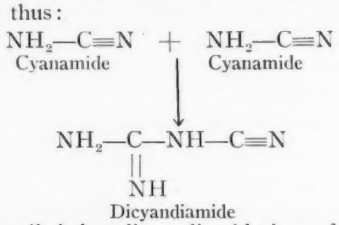
∝-chlorododecane by reacting it with thionyl chloride ($SOCl_2$). Then equal parts of the resulting ∝-chlorododecane and anhydrous sodium thiosulfate are boiled several hours in alcohol whereby the following reaction takes place:

$$\underset{\text{∝-chloro-dodecane}}{C_{12}H_{25}Cl} + \underset{\substack{\text{Sodium-}\\\text{thiosulfate}}}{Na_2S_2O_3} = Na.Cl + \underset{\substack{\text{Dodecyl-sodium-}\\\text{thiosulfate}}}{C_{12}H_{25}S.SO_3Na}$$

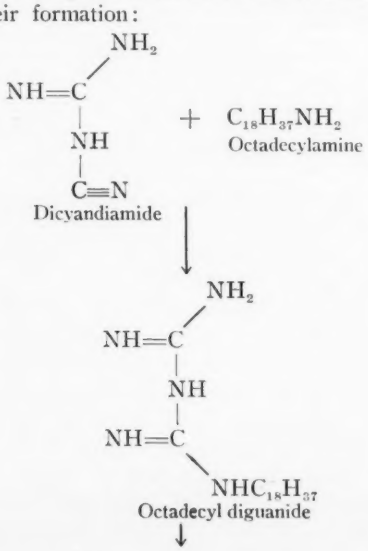
Instead of ∝-chlorododecane it is possible to use the corresponding ∝-iododododecane to obtain the same monododecyl thiosulfate. These products readily form sodium and ammonium salts which are water-soluble and thereby give foaming solutions—a sign of high wetting out power.

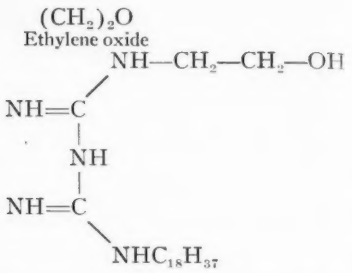
It is now interesting to consider how these fat and waxy products can be used with dicyandiamide for the production of softening agents.

Dicyandiamide results from the polymerization of cyanamide on warming in water containing a small amount of ammonia thus:



It may be recalled that dicyandiamide is useful in connection with the production of anti-crease finishes; with formaldehyde it forms white resins of the formaldehyde-urea type. But dicyandiamide is also useful in being able to react with high molecular fatty amines (for example, octadecylamine) which in turn are made from the fatty alcohols obtained from natural fats and waxes; the product of the reaction is a fatty diguanide. These special diguanides can be applied in textile materials so as to soften them considerably, but it is better that they shall be first treated with an alkylene oxide such as ethylene oxide whereby they are converted into softeners having better water-solubility. The nature of these softening agents is more easily understood from the following scheme showing their formation:





In treating colored materials with these oxyalkylated diguanides there occurs a change of shade which in most cases will be objectionable. To some extent this can be mitigated by after-soaping with a resin soap since in this manner a salt is formed between the resin and the diguanide. But on the whole it is much better to employ these products in the form of their salts with organic carboxylic acids such as salicylic, glycollic, and lactic acids; salts with mineral acids such as hydrochloric are less satisfactory.

It will be noticed that in preparing these auxiliaries the fatty alcohol or acid has first to be converted into its corresponding amine. This is achieved not without a considerable amount of difficulty. In this connection it may be remembered that the formation of methylamine is effected by first converting methyl alcohol into methyl chloride and then heating this within a closed chamber with ammonia. Unfortunately the same treatment does not satisfactorily change an alcohol such as cetyl alcohol into cetylamine; the high molecular weight of this alcohol appears to have a hindering action.

One method of obtaining the high molecular weight amine is that of first converting the fatty acid into the corresponding amide, then dehydrating this to the nitrile, and afterwards reducing this with sodium and alcohol. This is a somewhat round about method and expensive. Lately the simpler method outlined for methylamine has been made more successful by heating the alcohol in the presence of nickel and chromium catalysts with butylamine instead of ammonia. Progress seems likely along these lines.

One further slight defect of these diguanide softeners which requires remedy is that when used in hard waters containing sulfate and phosphate radicals precipitation of the softener takes place. This may be corrected by having present with the diguanide a dispersing agent free from acid groups. Among those dispersing agents which have been found very suitable are ethers formed between fatty alcohols and polyglycols, and esters formed between fatty acids and polyglycols or alkylated phenols of high molecular weight (for example, iso-octyl-phenol).

A good softening composition for use on rayon materials thus consists of a mixture of one part of *n*-octadecyl diguanide acetate and 0.3 part of polyhydroxyethylated isododecyl phenol (the dispersing agent). Another softening composition of this type consists of 50 parts of

(Continued on page 395)

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Members should notify the **Secretary** immediately of all address changes

CALENDAR OF COMING EVENTS

The Outing of the South Central Section, scheduled to take place at Lookout Mt. Hotel, August 1st and 2nd, 1941, has been cancelled.

Annual Meeting and Convention, Carolina Hotel, Pinehurst, N. C., Oct. 31, Nov. 1, 1941.

A System for Controlling the COST OF DYEING IN WOOLEN MILLS*

FREDERIC A. PRISLEY**

I WILL try to make a very unpopular subject as interesting as I can. I will assume that we all understand the fundamentals of any importance of cost and control of cost. My paper starts out this way: "The purpose of any system for control of dyeing costs is fundamentally to insure that color is added in a satisfactory manner to textile fibers or fabrics with a minimum expenditure of time and money for labor and materials." There is nothing novel about cost control for dyeing operations or for any other operations, but certainly there has never been a time when control of costs has been of such vital importance.

Ordinarily, it is not too difficult to accomplish any desired degree of control and to maintain costs within a reasonable limit, but there are conditions and factors which complicate the job to quite an extent, and which I have classified this way: first, the physical size of the dye house, that is, how many kettles there are, whether dyeing is carried out on a one, two or three shift basis, the kind of materials, the number of different kinds of materials being dyed, whether the kettles are all the same type.

All those factors have a bearing on cost. The amount of production of course is very imporatnt. We carry our cost figures out in dollars to four decimal places, which means to hundredths of cents. That may sound a little far-fetched, but, for example, if a certain cost increases a tenth of a cent a pound any given week, that is only a dollar in a thousand pounds, but when you dye 100,000 pounds it is $100, and if those $100 are spent needlessly you might just as well sit on a bridge and throw it into the river because you will never get it back.

The variety of materials being colored affects the difficulties of control costs. There are a good many reasons for it. For example, a shade may be set up and it may be satisfactory, so far as cost is concerned, on a certain stock. The raw materials market may shift and one type of stock may disappear from the market, and you have to use another one. The dyer doesn't get any warning of this. He gets an order to dye a certain shade which he has dyed before on one kind of stock, and they give him another kind. He doesn't have time to have the laboratory make a new formula. He has to put the stock in the kettle and go to it.

*Presented at meeting, New York Section, April 25, 1941.

**Chemist, Hayward-Schuster Woolen Mills, East Douglas, Massachusetts.

I counted up last week and found we dyed thirty different varieties of stock in the stock dyeing. That included all kinds of—well, I have to be very careful here. In the old days we used to call it shoddy, but now it is reused wool, I think. (Laughter.) There are more varieties of shoddy than I ever heard of or that you ever heard of. There are new ones all the time.

With thirty kinds of stock, including wool, silk, mohair, noils, and probably twenty different kinds of rags, the problem of controlling cost is just complicated that much more.

The number of shades that are going to be colored is a factor in the cost setup. Then there is the number of dyehouses and where they are located. These factors affect the time it takes to collect the data. One thing I found, which is very important, is the amount of clerical help in the dyehouse, and the kind of clerical help, inasmuch as we have to start in the dyehouse, and the final results, of course, are no more dependable than the data which comes into the cost center.

In order to collect the data for this system we worked out, we made up forms of which I have had slides made and which I will show you. With regard to these forms, the formula for anything we dye will belong on one of them. The whole dyeing operation, including piece dyes, were broken down with respect to cost operation; that is, every time the dyer did anything to a kettle of wool, or a set of pieces, which entailed some addition of material, it was considered a separate phase of the dyeing.

The specific problem which these forms helped to solve was about like this: We have four mills, two of them thirteen miles away, and another one about two miles away. That means four dyehouses, doing both piece and stock dyes. That means four overseers of dyeing. I found in any phase of the textile business that if you multiply the personal element, the difficulties grow as the cube of the number of persons involved grows. It is easy to get two people to agree on something, but it is very difficult to get four to agree. These mills are usually run in three shifts in the dyehouse when business is normal.

I have never counted the number of shades that we were dyeing, but it was quite a range of shades.

(*Slide* 1) I said rags or stock, and the word stock covers a multitude of things. Sometimes it is preferable that the stock be dyed in the rag before rag picking.

Mill	RAGS OR STOCK STRIPPED ONLY							
Date Colored	Kettle			Amt.		Stock		
MATERIALS USED	Lbs	Oz.	Grains	Price		Cost		Total
Boil Off								
Strip Neutralize								
Remarks				Total				
				Cost	lb.			
CD1				Standard				

Slide 1

Mill	RAGS OR STOCK DYED ONLY, NOT STRIPPED					Shade		
Date Colored	Kettle			Amt.		Stock		
MATERIALS USED	Lbs	Oz.	Grains	Price		Cost		Total
Boil Off								
Dyestuff								
Dyeing Chemicals								
After Treatment								
Remarks				Total				
				Cost	lb.			
CD2				Standard				

Slide 2

Opinions vary on that. Some people can dye rags and do a very nice job, but, as a rule, the rags vary so much in shade, one rag from another, that it is very hard for the dyer to get a representative sample. Even after they are stripped there is quite a variation.

This particular form is meant for those stocks which are stripped only and then used "natural." Most manufacturers—and this won't sound good to many of you dyestuff men, prefer, of course, to use stock natural, in its natural shade, or stripped, rather than dye it, because it costs so much less that way, but in cases where the fabric requires a dyed shade that you can't even imitate with natural stock or dyed stock, then we have to dye it. But this form is for those rags which are stripped and then used "natural," as it is termed.

This is a very simple thing to break down for cost because it consists of the boil-off and the stripping. This items "grains" doesn't belong on here, because we don't weigh out the materials for this job in grains, or even in ounces. It is usually a case of boil-off with ammonia. Sometimes the dyer feels he has to use something else. Maybe he does; we don't always agree on that. But sometimes he thinks he should boil-off with ammonia plus something else. It takes off some of the color so that his stripping is better and the resulting shade is lighter. You see, it is a constant fight in this business to get the stocks light enough so you can dye over them the bright shades that are demanded by the market. We can get plenty of stuff for black, dark brown, and dark blue, but some of these shades—bright greens, bright blues, and pale shades—are sometimes difficult.

So far as the form itself goes, the dyer fills out this part of it, the pounds and ounces. The clerk extends it and goes through the usual procedure there, and we get the unit cost per pound.

Would anyone like to ask a question at this particular time? I think it would be better to ask questions, if anyone has any, while a particular form is on the screen, rather than wait until afterwards.

(*Slide* 2) This is just the reverse of the other one. You see, the other one was stripped only, not dyed, and this one is dyed only, not stripped. This is for those shades which we are fortunate enough to be able to dye without stripping. Stripping can cost anywhere from a cent and a half up to nearly two cents a pound, and on a stock that costs you 28 cents in the beginning, it is a lot of money.

You see that here the stripping procedure is omitted. This material will be dyed, after boiling-off, with suitable colors, and here is a very sensitive place so far as the cost is concerned. This is where the money can go and go fast—the dyeing assistants. I could get a lot of arguments out of this crowd if I wanted to on this subject but I will stop there.

The after treatment will be, of course, in the case of top chrome colors, bichrome or fluoride of chrome, neutral chrome, sometimes formaldehyde, and so on. You see, these stocks contain plenty of silk. Most woolen mills carbonize everything unless it is an out-and-out manipulated fabric, but it is impossible to get rid of the silk. Nine out of ten worsted men's wear fabrics today seem to be decorated with silk, which is something that we can't help. We take what there is since we have no influence over that phase of our raw materials market.

(*Slide* 3) Here is where the money goes by leaps and bounds—on piece dyes. Of course, there are some very nice woolens piece dyed, but so far as our markets are concerned, they are popular priced fabrics, such as ski cloths, meltons, etc.

This is quite a job for the dyer. He has to boil-off his

Mill	PIECE DYE					Shade		
Date Colored	Yards	Pcs.		Lbs.		Style		
MATERIALS USED	Lbs	Oz.	Grains	Price		Cost		Total
Boil Off								
Strip Neutralize								
Dyestuff								
Dyeing Chemicals								
Speck Dyeing								
Speck Dyeing Chemicals								
After Treatment								
Remarks				Total				
				Cost | lb.		Cost | yd.		
CD3				Standard				

Slide 3

Mill	RAGS OR STOCK STRIPPED AND DYED					Shade	
Date Colored	Kettle			Amt.		Stock	
MATERIALS USED	Lbs	Oz.	Grains	Price		Cost	Total
Boil Off							
Strip Neutralize							
Dyestuff							
Dyeing Chemicals							
After Treatment							
Remarks				Total			
				Cost | lb.			
CD4				Standard			

Slide 4

goods. Thirty-two ounce goods are hard to handle in the washer, are hard to rinse absolutely clean. Of course, as they are dyed after fulling, they are tough to penetrate. They can give a lot of trouble unless they are handled about right. They have to be stripped in order to get the bright shades.

This form has been altered for slides, and on the original form the dyestuff bracket has more lines than that. Sometimes we have to use six or seven dyestuffs there.

This speck dyeing here, I should point out, is not speck dyeing as it is ordinarily understood when done in a washer. The speck dyeing which the dyer does is in more or less cold bath to be sure he has covered the silk, and ordinarily about half the shade goes on in this cold bath. Wool, after it has been stripped, will pick up dyestuffs a great deal faster than it will in its normal state, so that the silk is very often left behind here.

Here is where we can throw money away if we are not careful (indicating item "speck dyeing chemicals"). Sometimes it is almost necessary to put in those so-called speck dye assistants, those materials which slow up the absorption of color by the wool and keep it going on the silk.

(*Slide* 4) This, of course, covers the bulk of the work. It is the shoddy dyeing. This is very much like the piece dyeing except that there is no speck dyeing. These stocks are all stripped and dyed with the best colors we can get for coloring silk in the same bath, and as a rule are chromed with fluoride or bichrome.

(*Slide* 5) Of course, we have to dye some wool. (Laughter.) This, of course, is the easiest one, so far as the cost is concerned, because it is the old-fashioned top chrome method of dyeing, and there isn't much chance for a thing to get out of control except in the boil-off.

The way the system is set up, these forms are to be used

Mill	WOOL, MOHAIR, SILK, ETC.					Shade	
Date Colored	Kettle			Amt.		Stock	
MATERIALS USED	Lbs	Oz.	Grains	Price		Cost	Total
Boil Off							
Dyestuff							
Dyeing Chemicals							
After Treatment							
Remarks				Total			
				Cost | lb.			
CD5				Standard			

Slide 5

in the dyehouse and the so-called formula or ticket from which the drug clerk weighs up the charges for the kettles. These forms are then sent daily to my office, and the clerk extends them, prices the dyestuffs and chemicals, extends them, and calculates the cost per pound.

It is impossible to show by a silde, but each one of these forms is on a different colored paper. When the clerk has them all at the end of the week, and has them all figured, she makes a consolidated report or a summary sheet. She makes up a master sheet every day. She puts these sheets down on the desk flat with just this part showing, and so has all the information there. She adds

up the amounts. These sheets here are, we will say, yellow. She takes all the yellow sheets and adds up the pounds dyed in that particular dyehouse on this kind of a sheet. She gets the total money and gets the unit cost for dyeing wool in that dyehouse that day. At the end of the week she does the same thing with the summary sheets and we have it for the week.

Here is where the control comes in. We know, every week, what it costs to dye all the wools, the mohair, and so on, and we know pretty well what the average cost should be like. We know what the cost for the year is since we keep an accumulated figure for the year. If this figure for a week is up a fraction of a cent, or a cent, then we go to the form and we pick out all these colored sheets for that particular week. Then all we have to do is look down here (indicating item "Totals"). And we find certain shades are costing more than the average.

The value of a system like this is that as soon as you find that the cost is high you know the reason for it. It is not difficult to find out that the costs are high, but it is to find out why. This system was evolved with that point in mind, of not only knowing every day what the costs are, but if they are high, why they are high, because the first thing you do when you find the cost is high is to correct it or find out if it is justified. That is why this system is peculiarly valuable in that respect. As soon as a cost gets out of line you have, at almost the same minute, the reason for it.

Just to point out the efficiency of this system, by Wednesday, after the ending of a week, and on Saturday, these things are all figured and the summary sheets and the consolidated report is made up for amounts of dyed stock up to a quarter of a million pounds, and for 20,000 to 40,000 yards of piece dyes, and it is done by one girl on a calculating machine in forty hours.

DISCUSSION

Mr. Allison: Who fills out the form in the beginning?

Mr. Prisley: The dyer.

Mr. Allison: How do you persuade him to do it? Most dyers I know say they have too much to do already.

Mr. Prisley: He has to fill out a form for the drug clerk anyway. He might as well do it on this form. We have a check on all this, of course. The ordinary bookkeeping methods will tell you what the dyeing costs are.

Mr. Allison: At the end of each month?

Mr. Prisley: At the end of a quarter, or the end of an inventory period. You have your beginning inventory, your purchases, and your ending inventory, and you can determine what it has cost you.

Mr. Allison: Your stock dyeing in general is of the type of work which is done with a lot of feeds. Is it done in pretty well standardized stock dyeing, in one dip dyeing?

Mr. Prisley: It has to be done because in most cases the stock is changed. No two bales of rag strip down exactly alike.

Mr. Allison: Do you note the separate feeds on the sheet?

Mr. Prisley: They go on there.

Mr. Tisdale: Is there any account taken of the time in which a tract is in the dyehouse or a set of pieces is in the dye kettle?

Mr. Prisley: There is no record whatsoever of that and it would be hard to set up a standard time for it. There are some cases where piece dyes are dyed according to time. Mr. Krebs knows all about that.

Mr. Krebs: That is on worsted work, but on shoddy they can't keep it in the kettle too long.

Mr. Prisley: And you can't just keep them in so long and say they are done and take them out.

Mr. Krebs: That is true. I think your additions are made very rapidly.

Mr. Prisley: Those piece dyes don't have to boil over ten minutes before you start controlling, and you bring in your shade in a cold bath.

Mr. Allison: How many dye kettles is it normal for a dyer to take care of and still keep this sort of record?

Mr. Prisley: It is hard to answer that.

Mr. Allison: Is it five, ten, or twenty?

Mr. Prisley: Let me ask you, on one shift, two, or three?

Mr. Allison: I mean, running the three shifts with three separate dyers on one section. How many kettles does a dyer take care of individually?

Mr. Prisley: Our dyehouses are small, as woolen mill dyehouses go. There is a production of 60,000 or 80,000 pounds in three shifts and it doesn't take a great many kettles. They dye largely 500 pound kettles, and they get them out pretty fast.

But as far as the supervision goes, the dyer is on the first shift. A good reliable man whom you call a second hand is on the second shift, and there is someone in charge of the third shift, of course, but the tendency on the third shift is to finish up what the second shift has left in the kettles and then strip a few batches. Of course, sometimes they have to carry out the dyeing, but we do not have three dyeing overseers. One dyer is responsible for the three shifts. We don't try to do much piece dyeing on the third shift.

Mr. Allison: In the kind of work which the dyer does, he does not have to weigh out his own dyestuffs.

Mr. Prisley: No. The man we call the dyer is the overseer of dyeing who directs and supervises the dyeing operation, and there is one man on each shift who acts as a drug clerk.

Mr. Allison: And he keeps the cost system?

Mr. Prisley: The dyer gets an order for these shades and he makes out the formulas as fast as he gets the orders. When the time comes that the stock is ready in the picker room, or delivered to the dyehouse, this sheet is filled out and the drug clerk gets it. He knows what kettle it goes to and there it goes. The chemicals are usually weighed out on the dyehouse floor. We don't keep them in the drug room.

Mr. Schwarz: Do your carbonizing costs come in under dyeing costs?

Mr. Prisley: It is all piece carbonizing. That is a part of the finishing operation. Of course, this labeling act has been in effect longer than since last June or October when it was passed because the commercial standard gave us leeway of two per cent on a fabric which was to be labeled or considered all wool. The practice of carbonizing became general three or four years ago.

Mr. Borghetty: I take it that you send that form to the drug room directly. Don't you have any trouble, for instance, of it becoming very soiled? Do you use the original or the duplicate, or do you use that card just like that?

Mr. Prisley: They come up sometimes pretty badly smudged, and the clerk, of course, doesn't like it. However, I don't know what would happen if I went to the dyehouse and told the dyer that the formulas were getting dirty, and would he please be careful. They are always legible.

Mr. Borghetty: A carbon copy could be used.

Mr. Prisley: After doing these by the thousand she looks at one and she has the answer. She knows the price of every dyestuff. She carries that in her head. She never has to put down the price of a dyestuff, or a chemical. She has all the decimal equivalents of fractions of pounds in her head. She only uses the machine for the final extension. The legibility of the sheets is a factor, but they come up in pretty good shape, much better than they would if they tried to use a carbon copy. They would smudge it more with the carbon copy, with loose dyestuffs flying around the drug room. Does that answer your question?

Mr. Borghetty: Yes. I wondered how you were going to read them when they came back.

Mr. Prisley: Of course, if we can't read them, we call up and ask, "Why is this thus and this so," and so on.

Mr. von Bergen: We have to keep a record of each recipe, too, but we leave it more or less up to the dyer and expect him to know how far he should go. We keep all that information right on one sheet. In my opinion, it makes it difficult when you have a different sheet for each operation because you have to keep them together. Otherwise, when one gets lost—

Mr. Prisley: Yes, that is something that happens every once in a while. The cost department, in calculating the labor cost, uses the production figures that we get from these sheets, and sometimes a sheet gets lost. The mill keeps a record of their production, and we check with them every week. If they say the production is so and so, and we say it is so and so, we check back. Of course, each kettle has a kettle number on it, and we can soon find out whether or not we have lost a sheet. Sometimes a whole batch of them will get lost and then there is trouble. **(Laughter.)**

But this other gentleman had a very interesting question: How do we know the dyer puts it down? This check with the bookkeeping department at the end of every quarter works a lot better than it ever did, because if all the sheets are turned in and if we don't make any arithmetical errors, we know better than the bookkeeping department does what the actual cost is, because the bookkeeping department's costs depend upon inventories, and it takes a good man to take an inventory of a drug room full of dyestuffs and take it accurately. And here is a suggestion for dyestuff manufacturers: It would help the dyer and the dyer's clerks, and the drug room clerks, if the name of the dyestuff could be put on the barrel in letters about that high (indicating) in some material that wouldn't be smudged, so that at the end of three or four weeks you could still read it. As it is now, the dyestuff tag is on the cover of the barrel. The tag is torn off at some time or another for a record, and then they put it on in chalk. The chalk gets smudged, and any barrel that happens to be around a drug room for two or three months is apt to be lost in the shuffle. I mean, the name is gone. (Laughter.)

They don't like covers on the barrels because they have a scoop in one hand and perhaps a ticket in the other hand, and they don't like to have to handle a cover. It is much easier to stick the scoop in if the cover is off.

Mr. Brommelsiek: Doesn't your fire insurance, and so forth, demand that you keep your barrels covered?

Mr. Prisley: That isn't true in the State of Massachusetts so far as I know.

Mr. Brommelsiek: Another thing: Couldn't you have it so that your barrels would be standing in definite places all the time so that a man would know automatically what was in each barrel?

Mr. Prisley: It should be done that way, I agree with you. If I were the dyer, there would be the barrel, and it would be well labeled indeed.

Mr. Brommelsiek: If you go to all the trouble of making out forms of this nature for figuring cost, I think it would be a lot easier to make sure all your barrels were defined properly, so you could have no error of losing dyestuff in that manner.

Mr. Prisley: Well, it is still a tough job to take inventory.

Mr. Brommelsiek: We take it once a month, and you can be sure the check is within a hundred grams.

Mr. Prisley: Who does it?

Mr. Brommelsiek: Our accounting department.

Mr. Prisley: Have they got the formulas?

Mr. Brommelsiek: They know exactly how much dyestuff is coming in every month and they check up. We have to make an inventory every month, and we check it.

Mr. Prisley: And that is the dyeing cost?

Mr. Brommelsiek: Yes.

Mr. Borghetty: The sheet takes into consideration the actual dye cost, i.e., the material cost. In case you had one, or two, or three additions to make, which are actually more expensive than the dyestuff itself, what provision would you make to control that?

Mr. Prisley: If the dyer had to make the additions, he had to do it. Perhaps the kettle leaked, or maybe the drug man didn't weigh it up correctly in the first place.

Mr. Borghetty: Suppose he has a formula which isn't very good, but he isn't aware of it at the time, and then he has to make several additions, which would mean an extra hour or two of dyeing. Also, he could put them down as only one addition. There would actually be a much higher dyeing cost and you would have no control over it.

Mr. Prisley: That is hard to control. On a scale like that, it is hard to control every individual batch.

Mr. Borghetty: You would find that in the total dyeing in time.

Mr. Prisley: We take each one of these breakdowns, and we get the unit cost for each. We get the unit cost for boiloff, the stripping, or the dyestuffs only, for the dyeing chemicals, and so on, and he may be just high in the dyestuffs, you see. Well, we look back and we find a place where he has had to add a lot, perhaps, on several batches. We say he must have had a tough time, or, if there is enough of it, if it affects his unit cost a great deal, we ask him why. But, in the last analysis, he can't do too much of that, because if he keeps three of four batches a day in an extra half hour, it makes quite a dent in his production, because he will lose a batch a day out of three or four kettles. At the end of the week he has lost several thousand pounds, and it will be reflected in his labor cost.

SOUTH CENTRAL OUTING CANCELLED

DUE to the National Defense program and local army maneuvers in Tennessee, all hotels and recreation facilities are overcrowded every week-end in Chattanooga.

After contacting several hotels, the Outing Committee of the South Central Section has been unable to make satisfactory arrangements to accommodate their Summer Outing, which was scheduled for August 1st and 2nd. Therefore, they have decided to call off their Summer Outing this year.

TESTING WATER RESISTANCE OF FABRICS

THE Committee on Water Resistance of Fabrics of the American Association of Textile Chemists and Colorists, with Dr. Harold W. Stiegler of the American Cyanamid Company as Chairman, has recently drawn up tentative procedures for 1.—Hydrostatic Pressure Test, 2.—Spray Test and 3.—Immersion Test. These three tests, which have been adopted as tentative by the A.A.T.C.C., are the outcome of considerable investigation and actual use.

The tremendous increase in the commercial importance of water repellent fabrics has indicated the need for simple, reliable methods for evaluating their water resisting properties. Such fabrics possess three distinct properties which, therefore, require three separate tests for their evaluation. The proper use of the tests given here should yield sufficient information for a reasonably accurate evaluation of the water resisting properties of most fabrics.

The Hydrostatic Pressure Test makes use of a new form of tester as compared to the type previously specified in the standard A.A.T.C.C. test. It is much smaller, easily moved about, readily constructed and offers better possibilities of controlling the temperature of the water.

The Spray Test is a simple and convenient method for rapid semi-quantitative control work. It measures the resistance to surface wetting under conditions simulating those of rain.

The Immersion Test is designed to measure the resistance of the fibers in a fabric to the absorption and retention of water.

The well known "Box Test" (hydrostatic pressure) has been dropped from the A.A.T.C.C. list of standard test methods, and the original "Hydrostatic Pressure Test" replaced by the new method described here.

Detailed descriptions of the tests and apparatus will appear in the 1941 Year Book of the A.A.T.C.C., which will be published in the near future. Brief descriptions will be found in the Proceedings of the A.A.T.C.C. as recorded in the January 6, 1941, issue of the AMERICAN DYESTUFF REPORTER. The further work of this important Committee will be reported upon from time to time in these Proceedings. Additional information may be obtained by corresponding with the general secretary of the Association, Dr. H. C. Chapin, at the Lowell Textile Institute, Lowell, Mass.

OUTING, PIEDMONT SECTION

APPROXIMATELY 350 members and their wives attended the annual outing of the Piedmont Section at the Ocean Forest Hotel, Myrtle Beach, S. C., June 27-28.

Peter Gilchrist conducted the golf tournament, while Mrs. Henry Gaede took charge of the bridge game for the ladies. The meeting closed with a banquet Saturday night, June 28, at which time brief talks were delivered by S. L. Hayes and R. W. Philip on the subject of the national meeting to be held at Pinehurst, October 31-November 1.

Respectfully submitted,

D. STEWART QUERN,
Secretary.

NOTE: *A number of photos of the Piedmont Section Outing appear on the following page.*—ED.

OUTING, PIEDMONT SECTION

These snapshots at the outing of the Piedmont Section outing, at Myrtle Beach, S. C., June 27-28, were made by Robert W. Philip, editor of "Cotton," Atlanta, Ga., and councilor of the Southeastern Section, and are published through his courtesy.

Above are seen, left to right: Peter S. Gilchrist, of Charlotte Chemical Laboratories, who was in charge of the golf tournament, awarding one of the prizes to Robert Murphy, Jr., Asheville, N. C. Next, A. Henry Gaede, of Laurel Soap Mfg. Company, and a councilor of the Section, doing a tango with Mrs. Gaede. Next, Mrs. J. A. Parker, winner of the high score prize in the ladies' bridge tournament, receiving her gift from Mrs. Gaede. In the last panel, two gay dancing couples: Mrs. Arthur R. Thompson, Jr., with Samuel I. Parker, general sales manager of Ciba Co., Inc., and Mrs. Clifford W. Sampson, of Charlotte, with Norman A. Ruston, of Emery Industries, Inc.

Below, top row, left to right: C. O. Stephenson, of Ciba Co., Inc., Charlotte, and his bride of 2 months and 6 days, and John V. Killheffer, laboratory manager, E. I. du Pont de Nemours & Co., Charlotte. Little Miss McAteer, of Belmont, N. C., and a friend, watching the floor show assisted by Samuel I. Parker, whose daughter, Miss Bargaret Parker, is seated beside him.

Second row, some of those at the head table at the banquet, left to right: Mrs. L. M. Boyd, Mr. Boyd, who is representative of Scholler Brothers and chairman of the Section; Robert D. Howerton, of Calco Chemical Division, American Cyanamid Co., the Section's treasurer, and Mrs. Howerton. Samuel L. Hayes, southern manager, Ciba Co., Inc., who is general chairman for the Section for the annual convention in Pinehurst; T. R. Smith, vice-president of the association, and Mrs. Smith; and H. E. Kiefer, purchasing agent, Ware Shoals (S.C.) Mfg. Co., a councilor of the Section, and Mrs. Kiefer.

Third row: William A. Wolhar, of Rosemary (N. C.) Mfg. Co., and his table at the banquet. Seen facing the camera, left to right, are Mr. Wolhar, Mrs. Irving J. Royce, of Charlotte, Gorden E. Berkstresser, of Roanoke Rapids, N. C., and Mrs. Wolhar. The group at the right shows some of the Stein-Hall representatives and their wives: Mrs. Ira L. Griffin, Mr. Griffin, Mrs. T. C. Davis, Mr. Davis, Mrs. W. N. Kline, Jr., and Mr. Kline.

Fourth row, at left: reading clockwise around the table, Robert W. Philip, J. V. Killheffer, Mrs. C. W. Sampson, Mr. Sampson, Norman A. Ruston, and Mrs. J. V. Killheffer. In the group at the right are seen, left to right, Erwin G. Walker, of Greensboro, Calco Chemical Division, American Cyanamid Co.; Mrs. Joe L. Moore; R. E. Sumner, sales manager, Calco Chemical Division, American Cyanamid Co., and Mrs. Erwin G. Walker.

PATENTS*

FRANK S. LOW**

IT is my understanding that you gentlemen are interested in the subject of patents from the viewpoint of technicians rather than as patent attorneys. It is my belief that the old saying that "the man who acts as his own lawyer has a fool for a client" is, generally speaking, just as applicable to patent law as to any other branch of the legal profession. When the time comes for preparing and filing a patent application, and carrying on its prosecution before the patent examiner, my advice is that you retain a competent patent attorney. Care should be exercised to obtain, if possible, an attorney who has had experience with the class to which the particular patent will be assigned in the patent office. Along with the medical profession, patent attorneys are rapidly becoming "specialists."

I have found, however, that there is frequently a lack of knowledge or understanding on the part of technical men, salesmen, and even executives, as to the exact nature of a patent and of the various steps necessary or desirable in the way of recording the information and evidence on which a valid patent may be obtained and defended. I shall attempt to place this information before you as briefly and concisely as possible.

WHAT IS A PATENT?

"A patent is the grant by the Government of a seventeen-year right to exclude others from making, using or selling anything which the courts may hold to be within the purview of any one of such claims of the patent as may be held to be valid."

From the above quoted definition, it will be observed that a patent only grants the right to exclude others from manufacture, use and sale of the patented article or process. It does not necessarily guarantee to the holder the right to operate under his own patent. To illustrate this point, let us suppose that John Smith has obtained a patent on an article of furniture consisting of a wooden seat supported by three or more legs (in other words a stool). Now let's suppose that at a later date Richard Jones discovers that a more comfortable and generally more desirable article can be built by adding a back to the Smith stool. In the absence of any previous public use, description in the literature, or prior patent application, Jones would receive an allowance on his application for a stool equipped with a back, but he could not manufacture, use or sell this device without infringement, except by license or consent from Smith. On the other hand, Smith would not be permitted to add the back to the stools manufactured under his previous patent without consent of Jones. The above is a homely illustration of the difference between basic and subsidiary or improvement patents.

WHAT IS PATENTABLE?

The Federal law provides:—"Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country, before his invention or discovery thereof, [or who has invented or discovered and asexually reproduced any distinct and new variety of plant, other than a tuber-propagated plant] and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, or more than one year prior to his application, and not in public use or on sale in this country more than one year prior to his application, unless the same is proved to have been abandoned; may upon payment of the fees required by law, and other due proceedings had, obtain a patent therefor."

From the above it will be noted that the two requisites for patentability are novelty and utility. The things that may be patented are defined as arts, machines, manufacture or composition of matter. An "art" is considered to be a distinct method or process for producing something. A "machine" or "composition of matter" are simple and understandable terms. A "manufacture" is any tangible object made by man other than a machine or composition of matter, or a design. For example, a rug or similar textile fabric would fall within this classification, as would a new and useful type of glass or metal container.

WHO MAY APPLY FOR A PATENT?

Patent applications may be signed either by an individual inventor or by a group of two or more co-inventors.

"When several persons work together devising a new piece of apparatus, which of them should be included in the application for a patent? This is more than a mere formal question; for a patent issued to two parties is invalid if one of them is the sole inventor, and a patent issued to only one of two joint inventors is likewise invalid. However, a practice is rapidly becoming established, in the case of infringement of inventions made by employees of a corporation, of refusing to look behind the corporation's own choice of who is the inventor.

"But a less liberal rule prevails in an interference. There the true facts are almost certain to be brought out in the course of proving the date of invention. It is im-

*Presented at meeting, Rhode Island Section, March 28, 1941.
**Westvaco Chlorine Products Corp.

possible to add an inventor by amendment; and so, because of including too few names, the real first inventor is apt to be disregarded, and priority awarded to inventors who, although later, have nevertheless been more careful in this particular. A mistake in parties cannot be rectified by reissue.

"A joint application cannot be a continuation of a sole application. Whether a sole application can be regarded as a continuation of a joint application depends on whether it is in hands hostile or friendly to the owners of the joint application. Therefore, in cases of doubt, it is better to have too many applicants than too few.

"Obviously, two joint inventors cannot claim a conception date earlier than the first day on which they conferred together about the invention.

"If the inventor of the general idea, employs others to work out the mechanical details for him, and they make changes or improvements while thus employed, the entire device, including these changes and improvements, can be treated as the exclusive invention of the first party, or he can allowably include his helpers as joint inventors, if their contributions were real and substantial.

"Above all, do not include the name of a superior, out of mere courtesy, as a joint inventor. On the other hand, do not include the name of a subordinate, such as the draftsman or mechanic, just because he helped the real inventor to work out some details of construction.

"In the United States, for a patent to be valid, it must stand in the name of: the inventors, all the inventors, and no one but the inventors."

THE PATENT ITSELF

Every patent application, and any patent that may issue therefrom, is divided into two parts. The first or descriptive part known as the "Specification" and the second and controlling part called "Claims." The specifications usually include a brief description of the object of the patent and may also include arguments or explanations as to how the invention differs from prior patents of similar nature or intent. It must include necessary and sufficient drawings, examples and instructions so as to enable anyone "skilled in the art," to operate the process, or produce the product, covered by the patent. Disclosures made in the specifications but not specifically "claimed" in any one or more of the claims are not covered by the patent and may be used (but not patented) by others. Advantage may be taken of this fact by patentees to obtain what amounts to a publication concerning certain methods or products without actually claiming them. Not infrequently, undue zeal in amplifying a specification, without the use of corresponding thoroughness in covering all disclosures set forth in the specification by adequate claims, results in the creation of a weakness or loophole in the patent that may permit the use of the disclosed processes without fear of successful prosecution for infringement. Great skill and a fine sense of understanding of the underlying purposes of the patent are required for the proper co-relation as between the specification and the claims written into the application.

Each claim is considered as an individual patent. One or more claims may be declared invalid without invalidating the remaining claims. The claims are detailed statements of every possible combination of the new idea involved in the invention. It is frequently the practice to include one or more "broad" claims supplemented by a number of narrower ones reading more specifically on the exact procedure employed under the patent. For example, suppose it were discovered that undesirable impurities could be removed from a certain chemical product by leaching the crude product with a suitable alcohol in which the product itself was insoluble, but the impurity was soluble. Further suppose that ethyl alcohol was found to be the most suitable solvent, but that other alcohols were also useful if less desirable. The broad claim or claims would read on alcohols in general, whereas the narrow claim would cover ethyl alcohol in particular. The narrower claims in a patent may frequently consist of subordinate claims reading on the preceding broader claim. Of late, the so-called "Markush" type of claim has become popular. This is a claim in which the materials are selected from a group of analogous materials all producing a like result. For example, the original Markush case contained the following description:—"Materials selected from the group consisting of aniline, homologues of aniline and halogen substitutes for aniline." There seems to be no reason why the same principle should not be extended to mechanical claims. Care must be taken not to include an inoperative substance. The Patent Office looks with disfavor at undue multiplicity of claims; however, every effort should be made to see that all possible alternative methods for accomplishing the novel result disclosed in the patent are covered by suitable claims. Even though some of the claimed alternative methods or products may appear unable to compete economically with preferred methods or products.

STEPS INVOLVED IN ESTABLISHING INVENTION

The various steps involved as providing proof of inventorship and especially involved in establishing priority in case of interference may be set down as follows:

A. Date of Conception, and Acts establishing it.
B. First drawing or first written description.
C. First disclosure to others.
D. First reduction to practice.

The moment a new, useful invention is conceived, the inventor should at once prepare "an evidence of conception" in the form of a memorandum drawing, description or other suitable record of the idea. This should be signed by the inventor and independently signed and dated by at least one witness. This action actually covers the three steps listed—A, B and C above.

"One's next consideration should be to use due diligence in 'reduction to practice.' Actual reduction to practice consists in building and testing an actual operative machine or full size working model, performing the process, or making the product, depending on whether the invention is a machine, a process or a product. A mere laboratory test is sufficient. But the actual use of a machine inherently embodying the feature in question without consciously testing that feature, is not 'reduction to practice.' Commercial production is not necessary. Reduction to practice by one who has stolen the idea, inures to the benefit of the real inventor. Testing may be dispensed with, in the case of an invention so simple that its operativeness is obvious. The device relied upon need not be perfect, or even operative provided its defects are remediable by an ordinary mechanic.

"Constructive reduction to practice, i.e., filing an allowable patent application, is equally effective, and has the advantage of giving the inventor an earlier filing date, thus avoiding anticipations and statutory bars which otherwise might be cited against it. Also in an interference, the first party to file is given the benefit of every doubt. It has the disadvantage that the courts frown on 'paper patents.'"

"It is important to remember that failure to follow up steps A, B, and C by an actual or constructive reduction to practice lays the inventor open to a serious hazard of losing one's invention through lack of "due diligence." It is impossible to state what might constitute due diligence or lack of diligence in the eyes of the Patent Office, and the Courts. Two months' delay in reducing to practice has been held lack of diligence while six years has been held diligence. Leaving off work on one invention in order to work on another does not constitute diligence with respect to the first but leaving a complete invention dormant for several years for want of a certain associated element, has been held not to be lack of diligence. In general, we may say that due diligence is "diligence under the circumstances." The law encourages such delay as is required to test the thoroughness and utility of supposed inventions."

Having "Reduced to Practice" and assuming that complete and adequate evidence is assured in the way of properly dated and witnessed notebooks, news letters, interim reports or final project reports, etc., the only disadvantage of delay in filing an application lies in the risk of becoming the junior party to an interference, rather than the senior party. Therefore, it is frequently wise to delay filing an application as long as possible or until actual commercial operation of the newly invented process or commercial production of the newly invented product has been started. Once commercial operations are undertaken, care should be exercised that the application is filed well within the one year statutory period now permitted by the law for public use of the process or production of the product prior to filing the application. The above statements do not take into account the possibility of others using the process for more than one year and thus establishing a barrier to obtaining a patent.

NOTES AND RECORDS

We now come to what is perhaps the most important point of patent procedure, from the standpoint of the technical man's responsibility. I refer to the matter of the keeping of adequate notes and records. This subject can be covered by a few simple rules but it is of the utmost importance that these few rules be unfailingly and scrupulously followed.

On the inside cover of the notebooks used in our laboratories there is pasted an instruction sheet reading as follows:

"NOTEBOOKS should be kept with the thought in mind that someone else will have to read them and understand the data and observations recorded. Either pen or pencil may be used, and every effort should be made to make the meaning of entries entirely clear. The following rules have been adopted and should be scrupulously adhered to:

1. Each day, before entering notes, record the date. This applies whether the notes begin at the top of a page or following notes made previously.
2. Leave no blank pages, or parts of pages in the notebook.
3. At the end of each day's notes, sign your name and record the date.
4. Have a witness sign his name or initials directly below your signature and record the date.
5. Under no circumstances should false dates be entered. If you forget to sign your notes or have them witnessed the day they are entered, record the date on which the signatures are actually made, and make a note of the discrepancy."

Observation of these rules will save you considerable misery and grief and may save for you some important patent. Perhaps we should include an important "DON'T."

DON'T! Keep notes on loose sheets. Even the use of looseleaf notebooks is to be avoided. — Such records have much less standing before the Patent Office or the courts than a properly attested record appearing in its proper chronological order in a bound book.

INTERFERENCES

"When an Interference will be Declared.—

"An interference is a proceeding instituted for the purpose of determining the question of priority of invention between two or more parties claiming substantially the same patentable invention.

"The fact that one of the parties has already obtained a patent will not prevent an interference, for although the Patent Office has no power to cancel a patent, it may grant another patent for the same invention to a person who proves to its staisfaction to be the prior inventor,

and then leave to the Courts the question of which of the two patents is valid.

"An interference is never declared until at least one of the applications involved is in condition for allowance, except, of course, in the case of an interference between an application and an issued patent. As the rules state it, 'The invention which is to form the subject of the controversy must have been patented to one of the parties, or have been decided to be patentable.'

"An interference can be declared between two applications or between an application and a patent, if each contains a claim reading on the showing of the other; provided, of course, both claims are directed to the 'same patentable invention.' In this connection, applications for a reissue stand upon the same footing as applications for an original patent; and reissues stand upon exactly the same footing as original patents. No interference can be declared between a patent and an application, unless the applicant adopts claims from the patent within one year of its issuance.

"Notices of the existence of an interference are prepared by the Primary Examiner, and sent out to each attorney by the Examiner of Interferences. If the notices to a patentee are returned by the postal authorities undelivered, they are then published in the Official Gazette.

"Each notice informs the party that his application has been adjudged to interfere with the applications of certain other parties, naming them and giving their addresses, the titles of their inventions, and the names and addresses of their attorneys and assignees. The interfering claims are set forth in full, each being numbered as a 'count' of the interference. A date will be set, before which each party must file a 'preliminary statement.'

"After the notices have been sent out, the case comes into the jurisdiction of the Examiner of Interferences, and all action by the primary Examiner is suspended.

"Before the date set for filing preliminary statements, a party can:— (1) withdraw from the interference; and/or (2) file his preliminary statement; and/or (3) move to postpone the date.

"The preliminary statement is a sworn affidavit to the following facts:

(a) The date upon which the first drawing of the invention, and date upon which the first written description of the invention, were made.

(b) The date upon which the invention was first disclosed to others.

(c) The date of the first act or acts (other than the acts specified in [a] and [b]) which, if proven, would establish conceptions of the invention, and a brief description of such act or acts.

(d) The date of the reduction to practice of the invention.

(e) The date when he began actively exercising reasonable diligence in adapting and perfecting the invention.

(f) The date and number of every application for the same invention filed within twelve months before the filing date in the United States, in any foreign country adhering to the International Convention for the Protection of Industrial Property or having similar treaty relations with the United States."

In order to win an interference, the Courts have held that:—

1. "The first to reduce to practice need prove no diligence whatever under any circumstances.
2. "The second to reduce to practice must trace continuous diligence from a date prior to his opponent's conception date down to his own date of reduction to practice.
3. "If the first to reduce to practice was also the first to conceive, then he wins without further ado, unless he suppressed his invention until spurred into reactivity by the other party."

In connection with paragraph 3 just above, it should be noted that some care must be exercised in failure to patent a successfully developed process (that is, one in which reduction to practice has taken place in the laboratory, but commercial exploiting has not gone forward in the plant) lest, in case of a conflict or interference, the Patent Office or the Courts be led to conclude that a deliberate attempt to suppress the invention or delay the disclosure had taken place, or that early work was "abandoned."

"Of the two hundred Patent Office rules, forty-three relate exclusively to interferences, and nearly half of the rest touch upon the subject either directly or indirectly. Yet only a negligible number of the patent applications filed ever become involved in an interference. This giving of so much rule-space to questions which so seldom arise, shows the highly technical nature of interference practice, and the probability that any given patent attorney is apt not to have had sufficient experience with this branch of patent law to do justice to his client's case. An interference almost always calls for a specialist, just as does any other form of patent litigation.

CONTINUATIONS

"A later-filed application based upon the disclosure of an earlier co-pending application, is called a 'continuation' of that earlier application. This term embraces divisionals, renewals, revivals, but not a re-file application filed in place of another after the other has expired. If the new application contains some new subject matter, in addition to matter copied from the parent case, it is called a 'continuation in part.'

"A continuation or continuation in part is entitled to rely upon the filing date of the parent case as constituting its own 'effective' filing date as to all common subject matter, with the possible exception of matter shown but not claimed in the parent case.

"A sole application may be a continuation of a joint application, but not vice versa.

"An application becomes 'abandoned,' if the applicant

fails to make a fully responsive reply within six months after the latest office action, or becomes 'forfeited,' if he fails to pay the final fee within six months after allowance. Under certain circumstances the final fee may be paid more than six months after allowance without abandonment of the application.

"It is easy to remember which is 'abandoned' and which is 'forfeiture' if we reflect on the meaning of these words. One *forfeits* a right, in this case, the right to have a patent issue on an allowed application. One *abandons* an attempt, in this case the application for a patent."

"Abandonment and the filing of a continuation-in-part is the indicated remedy, when the applicant conceives of improvements, modifications or amplifications of this original idea; and especially if these improvements, etc., really date back prior to his original filing date, were omitted from his original application by oversight. For if claims to these improvements, etc., were inserted in a separate application, they might be held unpatentable over the claims of his original application; and if inserted in the original application, they might be held void as a departure from the original scope of that application; and furthermore, a continuation-in-part postpones the determination of the question as to how much of its subject-matter is entitled to the old filing date, and how much merely to the new."

INTERNATIONAL PATENT CONVENTION

"There is an international treaty, to which some forty countries including the United States are parties. It is generally referred to as the 'International Convention.' In addition to mitigating the working and non-importation requirements hereinafter referred to, it provides that no publication or public use, occurring subsequent to filing an application in the first Convention country in which filed, can invalidate an application filed in a second Convention country, provided that the second application be filed within one year of the filing date of the first. In other words, the *actual* filing date of the first, becomes the '*effective* filing date' of the second, for the purpose of avoiding the effect of anticipatory publications and public uses which have taken place between the two dates, provided the second application complies with the requirements of the Convention."

FOREIGN PATENTS UNDER INTERNATIONAL CONVENTION

It has been the experience of many American patentees that due to the numerous taxes, renewal fee requirements, etc., for actual or nominal use of the patent within the foreign country; that foreign patents, seldom return their cost to the applicant.

PURPOSE OF A PATENT

Patents may be divided into two general classes, — (1) "Offensive Patents" and (2) "Defensive Patents."

An offensive patent as the name implies, is one under which the holder proposes to actively exclude all others (except possible licensees) from use and enjoyment of the patented process or product. These patents cover new and potentially valuable processes or products and improvements in previously known processes and products. The patent law is designed primarily to give effect to the right of the inventor to exclude others from the enjoyment of his invention.

A defensive patent, on the other hand, is a patent under which the patentee (or his assignee) is simply trying to protect himself against possible exclusion by others, from the field covered by the patent. A great many patents fall in this class and this probably is a contributing reason for the fact that such a small percentage of issued patents are ever commercially operated. With one possible exception, the same protection could be obtained by the applicant, by a suitable publication of his discovery in a technical or trade journal without recourse to the Patent Office. The defensive patent, however, may have considerable value as a deterrant to others from deliberate infringement of the patent, whereas publication without patenting constitutes a more or less direct invitation to all potential competitors to use, the disclosed information without let or hindrance. As previously noted, disclosure in the specifications in some previously filed application without claims reading directly upon the information contained in the disclosure of the specifications can also become an effective protection against patenting by others.

Another protective device in cases where for any reason it appears inexpedient to obtain protection by means of an issued patent, consists of filing a properly attested memorandum containing all the explicit information necessary to verify the fact that the process was in operation in the plant of the deponent on a certain specified date or that it had been in use for a certain specified period, prior to the date of preparation of the deposition. This method is usually only resorted to in case the process or product that might be covered by a patent is such that infringement of the patent would be exceedingly difficult to prove without having access to the plant of the supposed infringer. In order for this form of protection to be at all effective, it is necessary that the evidence be prepared with all of the care devoted to the preparation of an actual patent application. It is desirable to have independent depositions prepared by at least two and preferably several employees sufficiently conversant with the operation in question, so that they can vouch for definite and detailed statements covering the operation in question and, in the event of their employer being called upon to defend his right to use the process disclosed in the deposition against any subsequent patents, that their evidence shall be complete and conclusive as to the facts of the operation of the process on the part of their employer at the earlier date. Since such depositions are inexpensive and may conceivably provide complete protection or freedom of action for the deponents, it is usually good policy to prepare them rather than make no effort to retain rights to process

on which patent applications are considered to be inexpedient.

USE PATENTS

By "use patents" I mean a patent covering some specific newly discovered use for either an old or a new product. The product itself may or may not be covered by a patent. An outstanding example of the value and importance of these so-called use patents is found in the numerous patents obtained by Ralph Hall and his coworkers in connection with sodium meta phosphate. This compound was discovered and described prior to 1850, so that no basic patent on the material or its method of manufacture could be obtained later than that date. Hall, however, undertook an intensive study of the properties and potential uses of this product that resulted in his obtaining many patents in a wide variety of fields of industrial application. These patents have resulted in Hall being able to maintain almost as complete a monopoly on the sale and use of sodium meta phosphate as though he had held basic patents on the product itself or its method of production.

It behooves the technical man therefore to remain forever on the alert to the possibility of patenting new uses, not only for newly discovered products of his own or other manufacture, but also for novel uses for old products not in themselves patentable.

In the case of a newly patented product or process, if sufficient confidence is reposed in the breadth and validity of the patent coverage thereon, it is common practice of some inventors to recite in the specifications of the patent covering their invention, the broadest possible list of uses for the new product. This serves as a publication of these uses and prevents anyone else from obtaining specific use patents which might estop the first inventor from exploiting his new product in some of its most important industrial fields. The principal reason for this method of procedure is of course to save the expense of preparing and prosecuting a number of separate "use patents." Also, a recitation of such uses in the specification of the parent patent can be couched in much more general terms and based on much less factual evidence than would be required if separate applications were to be filed on all of the suggested uses.

TRADE MARKS

A trade mark consists of the registration in the Patent Office of the use of special words, letters, numbers, designs or other permissible designations applied to the products distributed by the applicant, who need not of necessity be the manufacturer.

"All that the registration of the trade mark does is to add the right to resort to the Federal Courts for protection against infringers. A valid trade mark exists prior to registration; and, conversely, registration gives no vitality to a trade mark which is not in actual commercial use prior to registration.

"The words 'Reg. U. S. Pat. Off.,' or their equivalents, on an article, signify that the trade mark of that article has been registered; they do *not* signify that the article is patented. The proper notification of a patent is 'Patent,' followed by the number of the patent.'

The information necessary in order to effect the registration of a trade mark is a statement of the date (preferably, of course, the earliest) of shipment in interstate commerce of the article bearing the designation, it is desired to register as a trade mark, and six copies of the label, stencil or reproduction of the container design used in making such shipment.

All labels, stencils, packages, advertisements, technical or trade paper articles making use of trade marked designations, should carry the reference "Trade Mark Registered U. S. Patent Office" or the allowable abbrevated form "T. M. Reg. U. S. Pat. Off." If general use is made of the trade mark, without such designation either by the owner or by others, the validity of the mark may be seriously jeopardized.

As I stated in my preliminary apology for reading so much of this discourse from a prepared text; much of the material consisted of quotations from various official and unofficial sources. Of these quotations the majority were taken from a book entitled "Patent Practice and Law," by Roger Sherman Hoar. Published by the Ronald Press, 15 E. 26th Street, New York, N. Y.

We have found this book so satisfactory as a reference book for patent information that a copy of it has been placed in the library of each of our divisional offices and laboratories. I can candidly recommend it for that purpose.

Notice Re:

UNEMPLOYMENT REGISTER

Persons who are listed in the Unemployment Register and who obtained employment should notify the secretary or the American Dyestuff Reporter immediately in order that their applications may be removed.

Make your plans NOW to attend the

ANNUAL MEETING AND CONVENTION

CAROLINA HOTEL, PINEHURST, N. C.

OCTOBER 31st, NOVEMBER 1st

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the American Dyestuff Reporter any vacancies which may occur in their business.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

NOTICE TO EMPLOYERS

Personal Histories and Employment Records of the following applicants are on file at the office of the American Dyestuff Reporter. Prospective employers may examine them without obligation.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE.

A-1

Education—Graduate textile chemistry and dyeing course, Lowell Textile Institute, 1932. Special course in colloid chemistry at M.I.T.

Experience—Library work in spare time while attending school; five years as assistant chemist with knitting mill, duties consisting of testing and grading silk, testing of oils, soaps, dyes, finishes and other chemicals, making up specifications for various lines of hosiery and checking finished product, keeping a check on production costs, control of waste and irregulars, checking competing products and carrying on research to improve product and reduce costs. Woman; age 30; references.

A-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Textile chemist, cotton and rayon thread; agricultural chemist, protein, fat and mineral analysis; special Federal inspector on textiles, New York City; U. S. inspector, war department; chemist-spotter, dry cleaning experience. Age 32; married.

A-B-8

Education—Graduate Chemist.

Experience—Print superintendent, colorist; eleven years' experience in all types of fabrics, specializing on rayon; 8 years' dyestuff laboratory and demonstrating. Excellent references; age 37; married.

A-B-9

Education—Textile School Graduate.

Experience—Executive and sales type of textile chemist and colorist desires position in sales, contact, promotional or supervisory work. Factory, laboratory, office and purchasing experience. Good correspondent. Good personality. Accustomed to assuming responsibility and exercising initiative. 21 years' experience in the textile, chemical and dye industries. Opportunity most important. Age 43; American; married.

A-B-10

Education—1 year of textile chemistry, day course, Philadelphia Textile School; also business course.

Experience—3 years as apprentice in weaving mill in Germany, office and stock room, general clerical work, practice in all departments of cotton manufacture, dyeing, bleaching and finishing of cotton-rayon mixtures, piece and package processing; several mos. in laboratory of German dyestuff manufacturer, dyestuffs and assistants and their application, vat and naphthol dyeing.

Age 20; will go anywhere in U. S.

A-B-11

Education: Graduate chemist. Correspond and converse German, some French.

Experience: 3 years dyer; 4 years dyestuff testing, trouble-shooting, purchasing; 4 years demonstrating, consulting, and

supervising for large dyestuff manufacturer. Thoroughly experienced on rayon, cotton, silk, acetates, printing, vats. Fullest references as to character and ability. Seeks position as technician, consultant, or superintendent with reliable dyestuff sales organization or dyehouse. Age 33, married.

A-B-12

Education—Philadelphia Textile School (Evening), Chemistry and Dyeing, Quantitative and Qualitative Analysis.

Experience—Two years in yarn office, making wool stock blends. Last 6 years in dyehouse, 4 years as kettle hand, 2 years in piece dye work. Worked on yarn, raw stock and piece goods; has been dyer on union piece goods, cotton, rayon and wool, leaving wool white; also worked on all wool fabrics and woolen cross dyes; also considerable laboratory experience doing laboratory dyeings and extraction work. Seeks position as dyer or laboratory technician. Age 30; married; references.

A-B-13

Education—B.S., Chemical Engineering, Oregon State College, 1926.

Experience—First experience in dry cleaning plant; few months as sampling and control chemist with potash and chemical company; two years in dry cleaning plant, all phases of work; few months on routine and special analyses, plant problems, special studies and research for gas and electric company; 10 years teaching experience on textile chemistry, dyeing and textile testing covering all general and special courses in this field; consultant work with various mills. Seeks position in textile chemistry or dyeing.

Age 37; married; will go anywhere; references.

A-B-15

Education—Graduate chemistry, dyeing and finishing course, New Bedford Textile School, 1940.

Experience—None. Seeks position in dyeing or finishing departments or in testing (chemical, physical, microscopical).

Age 27; single; references.

A-B-C-9

Education—Lowell Textile Institute; chemistry, dyeing and textile finishing.

Experience—Twelve years head dyer in hosiery mills. Dyeing all types of fibers and in combination. Knowledge of all dye applications. Matching and formula making. Charge of every department in a hosiery mill except fixing machinery. Has done jigg work on cottons and rayons. Desires position in hosiery, or in any field. Would like to work as an assistant to head dyer in a woolen or rayon mill. Age 42; married. Will go anywhere in the United States.

A-B-C-10

Education—Graduate New Bedford Textile School, 1940.

Seeks position connected with chemistry, dyeing or finishing.

A-B-C-D-1

Education—Lowell Textile Institute, Bachelor of Textile Chemistry; Lowell Textile Institute (Evenings), 2 years D. C. Electricity; 2 years A. C. Electricity.

Experience—Six years as chemist and assistant dyer with a large organization. Specialized in dyeing, finishing, bleaching and drying of woolens, worsteds, cottons, rayons and unions in the piece. Some sales experience. Desires position as chemist, dyer, finisher, bleacher or sales. Age 30; American citizen; Married.

A-B-C-E-1

Education—3 years Chemical Engineer major in college; honor graduate Philadelphia Textile School, chemistry and dyeing course.

Experience—Ten years experience as chemist, colorist, technical director in bleaching, dyeing and finishing of cottons and rayons. Also one year's similar experience in South America. Instructor of textiles and textile chemistry in state vocational school, 2 years. Married; age 32; references; will go anywhere.

A-B-C-F-2

Education—Graduate, Lowell Textile Institute, 1908.

Experience—Over 30 years experience as chemist, color mixer and matcher, foreman printer, foreman dyer on all types of fibers and colors, and finisher. Experience installing complete dyeing and finishing departments. Experience as manager of dyeing and finishing companies. Experience in New York market: interviews with converters, obtaining orders, new customers, settling claims, etc.

Age 51; married, will go anywhere; references.

A-B-C-F-3

Experience—Broad experience since 1906 as overseer of finishing, general researcher, trouble shooter, overseer of dyeing, general superintendent, mill manager. Experienced in woolen, worsted, cottons, unions and mixtures. Recently specialized in men's wear cottons. Seeks position as overseer of finishing or dyeing, assistant superintendent, superintendent or manager.

Age 53, married; references.

B-6

Education—Graduate New Bedford Textile School; also post graduate work in advanced microscopy and rayon testing.

Experience—Five weeks in color shop of print works. Wants position in anything associated with textile chemistry, dyeing, finishing and testing. Single; age 21; references.

B-7

Education—Evening course in chemistry and dyeing at Philadelphia Textile School. Evening course in chemistry at Drexel Institute.

Experience—Started as second hand in dyeworks, then two years as head dyer on women's and children's hosiery. One year as head dyer with other dye works on all types of women's hosiery including Bemberg, rayon and cotton combinations.

Age 26; married; will go anywhere in U. S.; references.

B-8

Experience—20 years' experience with printing companies. Experience as colorist on basics, chromes, Indigosols, vats, rapid fasts, naphthols, Rapidogens and Aridyes. Seeks position as colorist and shader.

Age 49; married; references.

B-9

Education—Graduate of German textile school.

Experience—Twenty-seven years' experience abroad and in this country as chemist, colorist and dyer on cotton, rayon, wool, half-wool, half-silk and silk with various types of dyes and machines. Experience as trouble shooter.

Age 43; married; references.

B-C-1

Education—Two year night course in chemistry, Rhode Island School of Design.

Experience—Nineteen years' experience in printing and finishing plants, in practically every department. Has had direct charge of color shop and practical experience in both peroxide and chemic bleach. Also has had experience as assistant superintendent and superintendent of printing and finishing cotton and rayon piece goods and as company manager in finishing plant.

Age 38; married; references.

B-D-1

Education—General education in England. Chemistry and Dyeing Courses at Huddersfield Technical School.

Experience—Has been a superintendent of dyeing since 1911 Has had experience in worsted mills, hosiery mills and woolen mills. Congenial, sober and reliable. Married; references; age 53

C-1

Experience—1 year as second hand of grey room; 2 years as school teacher; 6 years as overseer of grey room, singeing, desizing and semi-bleach; 5 years overseer of cloth room, finishing and Sanforizing; 1 year night superintendent of mill; 3 years as overseer of grey room, finishing and Sanforizing.

Age 38; married; references; prefers South.

AMERICAN
DYESTUFF
REPORTER

A. P. HOWES
Publisher

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Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

Subscription price: $5.00 per year. Canadian, $6.00; foreign, $6.00

Vol. 30 July 21, 1941 No. 15

THE A.A.T.C.C. AND DEFENSE

THIS is written at a time when the European war and national preparations for defense are crowding aside all other considerations on the American scene. In such a time of rapid change, turmoil and controversy, there are certain aspects of the situation which deeply affect the activities of the American Association of Textile Chemists and Colorists and these will be briefly discussed.

As textile chemists and colorists we are very much concerned with preparedness because the manufacture of textile materials is a very large and important part of the defense program. Government specifications for textile purchases are, therefore, of primary consideration to us who are interested in methods of testing. Textile goods delivered to the Army and Navy in 1941 are far superior in quality to those obtained during World War I for two reasons: first, the development of an American Chemical Industry making available fast dyes from domestic production and, second, better specifications made possible by higher standards of textile manufacturing. In the development of these higher standards as they concern textile finishing, the A.A.T.C.C., through its general fostering of textile chemistry and dyeing and more particularly in its study of standard methods through its Research Committee, has played an important part of which we may well feel proud.

The accomplishments of the past have already been recorded in the A.A.T.C.C. Year Book. However, now is the time when our efforts for the future must be redoubled on all fronts. The research program for setting up standard methods of testing, the general encouragement of more efficient textile processing and support of sub-committees already co-operating with Government agencies, must be promoted with greater zeal by all of us. As textile chemists and colorists, it is our duty to further the cause of national defense in that field in which we have special competence and this we can best accomplish by promotion of the purposes of the Association as given in our Constitution.—CARL Z. DRAVES, *President, American Association of Textile Chemists and Colorists.*

A.A.T.C.C. YEAR BOOK

THE Year Book of the A.A.T.C.C., to which Dr. Draves refers, is assuming increasing importance each year as a standard reference work for textile chemical and other laboratories. To those of our readers who are not familiar with its contents a brief summary of them will be of value.

Part I is concerned with the organization of the association and contains the list of officers and committees, reports from national and sectional officers, and the constitution and by-laws.

Part II contains the reports of the Research Committee and of the various sub-committees (of which there are more than 30) working under its direction. This part reviews the work that has been done on various projects during the preceding year.

In Part III is published the standard A.A.T.C.C. tests, both official and tentative. Many of these tests have been adopted as standards by other associations and government agencies.

Part IV contains a tabulation of American dyes, identified by Colour Index numbers or foreign prototypes, and a list of textile chemical specialties. The dye list is the only such tabulation published in this country.

Part V consists of a listing of members—senior, junior, associate, student and corporate.

Members of the association all receive copies of the Year Book and the increasing number of copies sold each year to persons outside the association is an indication of its value to everyone.

The 1941 edition of this publication will appear early this fall and the Year Book Committee has spared neither time nor effort to insure that it will be a valuable addition to the library of anyone concerned with the textile wet processing or textile consumer field. The task of accumulating and editing the innumerable reports covers several months of intensive work on the part of the committee, the members of which are rewarded only by the satisfaction of a job intelligently and ably completed.

This essay would not be complete without a word concerning the advertising which appears in the Year Book. Without the support of the advertisers, the financial burden of publishing a yearly record would be too great for the association to assume. Accordingly the thanks of the industry and its individual members are due to the advertisers who have faithfully supported this valuable work through the past years and to those who are taking space in the volume now in preparation. Profits, if any, go to further the work of the association in its research activities. There is no profit for any person, rather the whole industry profits, collectively and individually, by the efforts of the committee who produce the Year Book and by the financial support of the advertisers.

TRADE NOTES • NEW PRODUCTS

• TEXTILE RESEARCH PROGRAM

The new working arrangement between the Textile Foundation and the U. S. Institute for Textile Research is actually in operation. Under the direction of Edward T. Pickard, now joint executive officer of the Foundation and the Institute, plans are being laid for the aggressive prosecution of a real research program.

Latest developments include:

1. Fessenden S. Blanchard, of Pacific Mills, newly-elected President of the U. S. Institute for Textile Research, has appointed as a Steering Committee for the Institute the special committee which developed the plan, composed of Mr. Blanchard, Mr. Pickard, and Dr. Robert E. Rose, of E. I. du Pont de Nemours & Co., a Vice-President of the Institute: Dr. Harold DeWitt Smith, of A. M. Tenney Associates, Treasurer of the Institute, and Douglas G. Woolf, Editor of *Textile World*.

In his letter to members of the Institute, advising them of the appointment of this committee, Mr. Blanchard stated:

"This committee will attempt to work out a long-run research program on which suggestions from leaders of the industry will be asked. The committee will, of course, appreciate greatly any suggestions from our members for work in the fields of technical, scientific and business research. The committee will also accept the aid of a special committee to study whatever revisions in the By-laws may become necessary in order best to conduct and finance this research and carry out the purposes of the new plan."

Cooperating with the Steering Committee, on all matters affecting both the Institute and the Foundation, will be a special committee of the latter composed of Franklin W. Hobbs, president of Arlington Mills and chairman of the Board of Directors of the Textile Foundation; and Frank D. Cheney, of Cheney Bros., and Donald Comer, of Avondale Mills of Alabama, both also directors of the Foundation.

Referring to the new working arrangement between the Institute and the Foundation, Mr. Blanchard stated: "I am confident that all the members will feel that the new arrangement is greatly to the advantage of our organization as well as to the advantage of the Textile Foundation, and through both groups to the textile industry and the public which it serves. With the cooperation of our members and the increased support from the industry which we hope to obtain, we are certain that real progress through textile research will be made."

2. A Committee on Publications and Publicity has been appointed consisting of Douglas G. Woolf, editor of *Textile World*, chairman; Earl Heard, Dean of the Philadelphia Textile School; Dr. Louis A. Olney, of Lowell Textile Institute; Dr. E. R. Schwarz, of Massachusetts Institute of Technology; and Stanley B. Hunt, of the Textile Economics Bureau. This committee will not only decide the form of the organ which will replace the bulletin *Textile Research* at the end of the present fiscal year, but will also be responsible for the publicity and promotional program reflecting to the industry at large the research accomplishments of both the Institute and the Foundation.

3. The Research Council of the Foundation, under the chairmanship of Dr. W. D. Appel, of the National Bureau of Standards is working closely with the Steering Committee in the development of long-range research plans.

It is hoped that a definite program covering all these points will be in shape for submission to the members at the annual meeting in November.

• NATIONAL DEFENSE POSITIONS

Trained personnel in every branch of industry, science and business is being called to Government service in this time of emergency. Individuals who know industrial methods and processes from first-hand experience are needed to contribute their part toward the integration of the expanding defense program. The Civil Service Commission has just announced an examination for Industrial Specialist positions paying from $2,600 to $5,600 a year. The examination (Announcement No. 102) is open for one month only. Applications will not be accepted at the Commission's Washington office after August 7.

Industrial specialists may be called upon to perform any of three types of jobs. The first is that of liaison representative in developing and maintaining working relationships with manufacturers of materials or equipment vital to the defense program. Secondly, they may act as consultants on industrial materials, methods and processes, or they may examine and evaluate data secured from the reports of various industrial concerns. The third possible assignment is that of investigator and analyst in the field of industrial materials, which involves the collection of data on production techniques, uses, consumption, and market supplies of particular materials.

To qualify for these positions, experience is required that has given the applicant a thorough knowledge of production methods and processes in one or more manufacturing industries. This experience may have been in industrial management, planning, engineering, cost accounting, business analysis, or research. Applicants may substitute resident study in an educational institution above high-school grade, up to a maximum of 4 years, for this general experience. For each of the positions, applicants must have had some experience in one (or in a combination of not more than three) of the following industries:

Iron and steel; Non-ferrous metals; Machine tools; Ordnance; Aircraft, marine and automotive equipment; Railroad repair shops; Radio and other electrical equipment, supplies and apparatus; Textiles; Forest products; Paper; Printing and publishing; Chemicals; Plastics; Products of petroleum and coal; Rubber products; Stone, clay and glass products; Leather and its manufactures; and Food and kindred products.

Applicants are rated on their education and experience and upon corroborative evidence. An oral examination may be given to determine further an applicant's qualifications for the positions. No written test will be given. Further information and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission in Washington.

• BORNE SCRYMSER PLANT ADDITION

Ground has been broken and construction is already under way on the new two story brick and steel office building to be erected as an addition to the Elizabeth, N. J. plant of Borne Scrymser Company. The building will have a frontage of approximately fifty feet and a depth of one hundred and will be situated in the center of the Front Street side of the plant site.

Upon completion of this new unit, which is anticipated by early fall, the executives, clerical force, and the sales department will be moved from their present New York City location to the new building.

Some resulting economies of operation are expected and the company feels that greater benefits will accrue as a result of the improved and more compact facilities of the administrative, producing and selling departments.

Since 1874 Borne Scrymser Company have manufactured lubricating oils and greases, and chemical specialties for the textile, tanning, ink, cosmetic and other trades.

• OPEN SOUTHERN OFFICE

To better serve the South's growing textile industry and to be closer to the scene of a steadily increasing practice of

scientific diversified agriculture, as well as for greater convenience in supplying other chemical using industries, Warner Chemical Company and associates, California Chemical Company, the Magnesol Company and the Monarch Chemical Company have established southern headquarters in Greenville, South Carolina, where they are located in rooms 804-5 in the Woodside Building.

The Warner Chemical Company is one of the country's large producers of caustic soda, chlorine, sodium phosphates and other chemicals used in the textile industry. The California Chemical Company is a producer of magnesium oxides from seawater and their product Seawater magnesium oxide is an important ingredient of fertilizer mixtures for magnesia deficient soils. The same company also supplies the important defense material magnesite for patching the linings of open hearth steel furnaces.

The Magnesol Company produces Magnesol, a powder used on dry cleaning plant filters for the removal of impurities from dry cleaning solvent. The Monarch Company is one of the oldest American producers of baking powder and sells principally to the baking trade.

• CATALOGUE ON PROCESS EQUIPMENT

A new 28-page catalog, describing a complete line of agitators, mixers, digesters, kettles, ball mills and pebble mills has just been issued by the Process Equipment Division, H. K. Porter Co., Inc., 4903 Harrison St., Pittsburgh, Pa.

Comprehensive specification tables are included with pictures and description of each piece of equipment, enabling the reader to determine speeds, sizes, etc., best suited to his needs. In addition to the descriptions of process equipment, one page is given over to Porter Industrial Locomotives.

The catalog also contains interesting information and tables relative to capacities of dished bottom tanks, weights of materials, volume, etc. A free copy will be mailed to anyone requesting it on his business stationery.

• OUTING, A.A.T.T.

The annual outing of the American Association of Textile Technologists will be held at the Sands Point Bath Club, Port Washington, L. I., N. Y., on Friday, July 25th, 1941. Assembly will be at 2:00 P.M., and a dinner-dance will start at 7 o'clock. Swimming, diving, games and tennis events are on the program.

• GENERAL RELEASE

General Dyestuff Corp., 435 Hudson Street, New York, N. Y., announces release of a circular describing the following product:—

Benzo Copper Blue BR Extra—a direct dyestuff said to be well suited for the dyeing of various forms of cotton or rayon. It produces bright, reddish shades of blue said to be of moderate fastness to washing, water and light and fairly good fastness to perspiration. When aftertreated with copper sulfate somewhat redder shades are obtained which are said to show somewhat improved wet-fastness and very good fastness to light. In union dyeing at the boil the wool is dyed somewhat weaker and redder than the cotton; at 150° F. the wool is but lightly stained and can be kept practically white by the addition of Katanol W or WB Conc. to the bath. Circular G-271.

• APPOINTS SOUTHERN REPRESENTATIVE

S. Blickman, Inc., of Weehawken, N. J., announces the appointment of the Slaughter Machine Company, Charlotte, N. C., as represntative for the sale of Blickman stainless steel textile dyeing equipment, effective July 1, 1941. Slaughter Machine Company will cover the states of Virginia, North Carolina, South Carolina, Tennessee, Georgia and Alabama.

Representation of S. Blickman, Inc., in Charlotte brings to the important textile producers in the southern area an opportunity to learn more about Blickman textile dyeing equipment and to have full information about the new features incorporated in stainless steel dye boxes, stainless steel dye box linings, dye cans, dye jigs and other items in the line of stainless steel, corrosion resistant dyeing equipment with round corner construction produced by S. Blickman, Inc.

• 3,000 TRADE NAMES "FREED"

Approximately 3,000 trade names which were in use in the fabric, wearing apparel, yarn and thread trades, have just been "freed" for adoption by new users, as a result of a periodic "clean-up" of the files of the Trade Mark Bureau of the National Federation of Textiles, Inc. Every firm which was on record with the Bureau (numbering nearly one thousand) was asked to cancel names no longer in use. Approximately half of the "freed" names (1500) had also been registered at the U. S. Patent Office.

The names released will be recorded for new users on a "first come, first served" basis, at the prevailing nominal fees of $1.50 per application for the recording of a single name or $20.00 per book of 25 applications (80c each) which may be used as desired.

• PURCHASE SYNTHETIC RESIN BUSINESS

Hercules Powder Company announced recently the purchase of the synthetic resin business of John D. Lewis, Inc., of Providence, R. I., a producer of synthetic resins. With this acquisition, Hercules, one of the largest producers of rosin in the United States, and also a manufacturer of synthetic resins, becomes a major unit in the production of synthetic resins.

Through this transaction, effective July 1, 1941, Hercules acquired the land, buildings, equipment, and processes of the Lewis synthetic resin plant at Mansfield, Mass., and the entire plant at Brunswick, Ga. Lewis products, which Hercules will continue to manufacture, include Imperial ester gum, Lewisol maleic-modified ester gums, Lewisol phenolic-modified ester gums, and various phenolic and alkyd resins. John D. Lewis, Inc., will continue in the production of textile and heavy chemicals at Mansfield, Mass.

The Lewis company's sales and manufacturing facilities will be joined with the Synthetics Department of Hercules, which has been producing synthetic resins since 1936 under the direction of W. M. Billing.

"The addition of the established Lewis products to the family of Hercules rosin esters—Hercolyn, Abalyn, Flexalyn, Pentalyn, and Staybelite Ester No. 10—now puts at the disposal of users, from a single source, a complete series of the commercial types of rosin esters. These will be constantly augmented and improved to meet the changing requirements of paint and varnish," the company's announcement said.

"The phenolic and alkyd resins, produced by the Lewis company, will bring Hercules into a new field of manufacture for which its chemical research facilities are well adapted through its work on Petrex acid and Petrex resins for varnishes and lacquers."

Since its founding in 1866, John D. Lewis, Inc., has had an important place in American chemical history which will be retained through their continuing the manufacture of textile and heavy chemicals. For 16 years, its synthetic resins have been widely accepted in paint and varnish and other industries. The Mansfield, Mass., plant serves customers along the eastern seaboard, while a second plant at Brunswick, Ga., adjoining the Hercules naval stores plant, is strategically located close to the source of rosin supply. Ample stock points are well placed to serve industry.

John B. Lewis, president and treasurer of John D. Lewis, Inc., will act as consultant for Hercules Powder Company during the time required for consolidation, making his headquarters at Providence, R. I. Howard Bates, Vice-President of the Lewis company, will join the sales staff of the Hercules Synthetics Department, with headquarters temporarily at the Mansfield plant.

The Mansfield plant will be operated under the direction of R. F. Schlaanstine, director of operations of the Synthetic Department. Dr. R. Marx, technical director

of the Mansfield plant, will continue in this capacity. The Lewis plant at Brunswick, Ga., will be operated by the Hercules Naval Stores Department for the Synthetics Department.

• CALCONESE BRILLIANT RUBINE 2B

Calconese Brilliant Rubine 2B is an acetate rayon dye being featured by the Calco Chemical Division, American Cyanamid Company. According to a color announcement issued by that company, this dyestuff is recommended for pink, wine and Bordeaux shades and as a component in formulations for tan or brown on box or jig.

Tables, in this announcement, indicate that Calconese Brilliant Rubine 2B has excellent fastness to light, fulling, washing, and pressing.

It is stated that, because of excellent fastness properties against white wool, it is recommended for staple acetate rayon fiber when blends are to be prepared with fast colors on wool stock. For formulations of the lighter shades for which a small amount of red is needed, its fastness is said to be satisfactory to potting, sea water and perspiration.

The announcement folder also describes suggested dyeing methods and shows mounted swatches of the acetate, acetate and viscose rayon mixed, and staple acetate dyed with Calconese Brilliant Rubine 2B.

Copies of this color announcement, which gives complete fastness tables for Calconese Brilliant Rubine 2B, may be obtained from Calco at Bound Brook, N. J.

• 110TH BIRTHDAY

On July 20th, 1941, the Philadelphia Quartz celebrated its 110th anniversary. The business was started on July 20th, 1831, by Joseph Elkinton who manufactured soap and candles. The soap kettles were in the rear of his establishment and the bars of soap were sold at retail in the store in the front. His "Family Soap" bars later found their way to the south, west and north and along the coast to foreign lands.

After his sons, Joseph S. and Thomas, had finished their schooling they took an active interest in the soap factory. The young brothers had a deep concern about new developments and improvements in the soap field. It was Thomas who investigated soluble glass. Early in 1858 equipment was bought for experimenting with silicate of soda.

In the '60s, the war between the states caused curtailment in rosin supplies from the South. Other soap materials also soared in price. Soluble glass was mixed with the soap as a substitute for the rosin and was found successful. The new soaps found favor with their customers and other soap makers came to the Elkintons for supplies of silicate of soda as well as instructions on how to use it in their formulae.

Then began a company tradition which at that time was unusual, that of giving information and assistance to the user which enabled him to obtain maximum benefits from the products. The forerunner of a series of comprehensive educational bulletins was published shortly after 1864. Then silicate of soda was tried for other things and ever since this practice has been constant. The adhesive value of silicate of soda was early discovered, but it was not until the introduction of the corrugated shipping box in the '90s that there was a large demand for silicate as an adhesive. Research of the company over a long period has developed a series of chemicals made by varying the proportions of the ingredients of silicate of soda. Now from the one solution originally produced, the company's catalog includes over 33 different silicates.

In January, 1862, the father withdrew his name from the firm and left the conduct of the business to his sons under the name of Joseph S. & Thomas Elkinton. The present name, Philadelphia Quartz Company, was used in 1864 when a partnership was formed to manufacture the new chemical silicate of soda. Soap manufacture was discontinued in 1904 when the Philadelphia Quartz Company was incorporated.

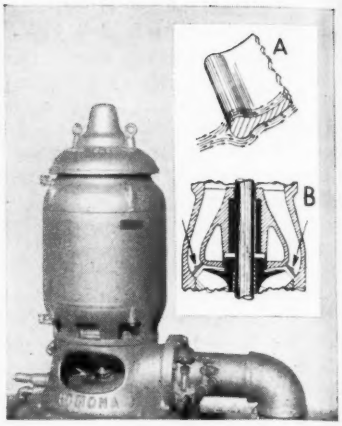
About the time of the celebration of the company's beginning of another century in business came the announcement of two new alkalies, previously not commercially obtainable. These chemicals, sodium metasilicate and sodium sesquisilicate made available to industries, alkaline cleaners which had active alkali qualities but which were controlled by silica content.

The company reached the beginning of a second century under the direction of only the third generation of the family of the founder. William T. Elkinton, son of Joseph S. Elkinton, continued the head of the enterprise until his death in October, 1933. He had devoted more than 50 years to the building of the business. His son, Thomas W. Elkinton, is now President of the company.

The Philadelphia Quartz Company, with general offices in Philadelphia, today has nine plants, located at Chester, Pa.; Anderson, Ind.; Baltimore, Md.; Buffalo, N. Y.; Kansas City, Kans.; Rahway, N. J.; St. Louis, Mo.; Utica, Ill.; Jeffersonville, Ind.; and is affiliated with Philadelphia Quartz Company of California, Ltd., who operates plants at Berkeley and Los Angeles.

• NEW PUMP DESIGN

The Pomona Pump Co., St. Louis, Mo., and Pomona, Calif., has recently been granted patents covering design improvements which are said to eliminate hydraulic losses in pumps, thereby increasing efficiency as much as ten per cent. These improvements, now included in all sizes of Pomona Vertical Turbine Pumps, involve fundamental design changes in the guide vanes, function of which is to alter, from horizontal to vertical, the flow direction of fluids being pumped.



Typical Pomona Vertical Pump, equipped with new type guide vanes. Insert A: Bulbous shaped end of guide vane, showing even flow of fluid. Insert B: Cross-section of bowl assembly. Arrows indicate location of guide vanes.

Previous practice in pump manufacture dictated that these guide vanes can be constructed as thin as possible on the advance edge, on the theory that the less metal the fluid would strike, the less would be the resistance encountered. However, it was discovered by Pomona engineers that, because fluid being discharged by the impeller element flows across the guide vanes at various angles (instead of always directly across the advance edge), eddy-friction losses are encountered, reducing the efficiency of the pump.

It is claimed that, by forming these advanced vane ends of a bulbous shape, it was discovered that regardless of the flow direction of the fluid, its direction would always be substantially tangential to the vane surface. Thus, it is stated, greater uniformity of flow pattern is secured, friction is reduced and efficiency of fluid lift is increased. Furthermore, because of the recessive curve at the rear of the bulb-shaped vane, it is said that eddy currents are not developed as under former circumstances. The manufacturer will be pleased to supply explanatory literature upon request.

• NEW WETTING AGENT

A new synthetic wetting agent, said to possess unusual properties, is announced by Rohm & Haas Company, 222 West Washington Square, Philadelphia, manufacturers of textile chemicals. Known as

Triton E-79, the new material is said to be valuable for its "wetting-back" properties. When dried into a fabric, it makes subsequent wetting-back faster and more complete.

Triton E-79 is unusual in that it is both oil and water soluble making it useful in the preparation of oil and water emulsions. The product also is said to have excellent wetting and cleaning properties.

• EMULGOR A

Textile oil emulsions which are said to be unaffected by aluminum sulfate, sulfuric acid and other salts and acids can now be made by the use of a new emulsifying agent recently developed by the Glyco Products Co., Inc., 230 King Street, Brooklyn, N. Y. This emulsifying agent, known as Emulgor A, is completely described in a bulletin, which also gives numerous formulae using Emulgor A. A copy of the bulletin is available free on request.

• "VINYON" FILTER FABRICS

"Vinyon" filter fabrics are today said to be considered a standard tool of the chemical engineer, for use wherever strongly acid or alkaline solutions are to be filtered. In some such applications, slower, more costly methods are said to have been greatly improved. In others, "Vinyon" cloths have been substituted for other cloths, and have demonstrated their value not only in the extra life of the cloth itself, but also by improving continuity of operation. This is especially true in continuous filters where opening up the box to replace the cloth means considerable lost time and production.

Following are a few representative filtration processes in which "Vinyon" cloths are claimed to have proved their practical usefulness:

Production of Titanium Dioxide. Precipitated in finely divided particles from strong sulfuric acid solution. Filter cloths previously tried were unsuitable due to acid attack, but "Vinyon" cloths are said to be serving well, lasting indefinitely.

Production of Dyestuffs. Many dyestuffs are produced in strong acid solutions from which they must be filtered. In this field, "Vinyon" filter cloths have proved highly practical, it is claimed.

Purifying Caustic Soda. Removing solid impurities from concentrated sodium hydroxide solutions constituted a problem, since the caustic attacks ordinary filter cloths. "Vinyon" cloths, however, are said to be unaffected and are being used with considerable success in this process.

Purifying Bleaching Solutions. Paper producers and laundry operators are using "Vinyon" filter cloths in hypochlorite recovery, because they are said to be proof against the oxidizing action of the solution, and have adequate mechanical strength.

It is stated that "Vinyon" cloth's greatest asset is its chemical inertness. Except for a few little used substances, such as certain ketones, esters, amine, and lower aromatic hydrocarbons, it is claimed to be immune to chemical attack. The only deterioration thus far noted in "Vinyon" filter cloths is due entirely to mechanical wear, a factor present in all types of filter cloths.

A wide variety of "Vinyon" fabrics are now being produced by Wellington Sears Co., New York. Cloths of all required weights, thicknesses, and perosities are available on specification. One of the most popular types for general applications is said to be a tightly woven duck construction, weighing 13½ oz. per sq. yd. Other twills and chain cloth constructions are also widely used.

• REAPPOINTED A DIRECTOR

The reappointment by President Roosevelt of Donald Comer as a member of the Board of Directors of Textile Foundation for a term of four years, has recently been announced by the White House.

Mr. Comer, of Birmingham, Ala., one of the country's leading cotton manufacturers, is distinguished not only as an industrialist, but also for his long record of public service as a private citizen. He is intimately associated with Alabama's fine record of social advances, and has always been in the forefront of movements to improve the position of the cotton textile industry as well as that of the workers and public associated with it.

Mr. Comer's reappointment is of particular significance at this time, in view of his warm enthusiasm for the Foundation's plan for the expansion of its activities, through closer association with the United States Institute for Textile Research.

Fats and Waxes in Disguise

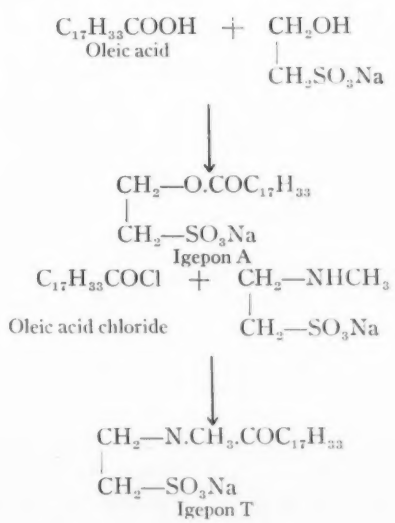
(Continued from page 374)

n-octadecyl diguandie hydrochloride and 25 parts of oleyl alcohol polyglycol ether.

Before leaving these methods for making fatty products into softening auxiliaries it may be recalled that many of the sulfonated fatty alcohols can be employed for this purpose. These products have been well described in past years so that it is not necessary to deal with them in detail. As their name suggests they are made by sulfonation thus:

$$\underset{\text{Octadecyl alcohol}}{C_{18}H_{37}OH} + H_2SO_4 = \underset{\text{Octadecyl sulfonic acid}}{C_{18}H_{37}OSO_3H} + H_2O$$

There is, however, a variation of this process, in which the introduction of the sulfonic acid group is brought about by condensing a fatty acid with an oxyethyl sulfonic acid or by condensing a fatty acid chloride with an alkylaminoethyl sulfonic acid. It is by such a process that the well known Igepons A and T are made and this is indicated below:



An essential feature of these sulfonated products is that, unlike ordinary soaps which are simply the sodium salts of fatty acids, they are quite stable in hard water. They can, in fact, be employed for softening purposes under slightly acid conditions. This is an advantage, for example, when it is desired to take away a scroopy handle on acid wool goods without introducing alkalinity.

WATER REPELLENCY

That natural fats and waxes would be suitable for giving water repellent properties to textile materials of all kinds is to be expected on account of the well known immiscibility of these substances with water. But although at one time simple impregnation of the cotton, wool, or other material with the natural fat or wax would be considered sufficient and satisfactory, this is no longer so today in view of the growing demand that water repellent properties should be sufficiently permanent at least to last the normal life of the fabric or garment. For this reason these natural products must be converted into auxiliaries which either are capable of chemically combining with the textile material to form stable compounds or which have a strong affinity for the material as to be able to withstand washing and preferably also dry cleaning. Success in this direction has been attained and some account of the various auxiliaries having a fatty alcohol or fatty acid basis will now be given.

One interesting type of auxiliary for conferring water repellent properties on cotton and wool materials (this implies that they are also suitable for rayons and silk) is that represented by Velan (I.C.I.). The idea behind such a product is that a chlormethyl ether derived from a high molecular fatty alcohol such as stearyl alcohol and having the following chemical structure

$$C_{18}H_{37}O.CH_2Cl$$

∝-Chloromethyl stearyl ether

is capable of reacting with textile fibers having a reactive hydroxyl group so that the fatty alcohol residue becomes chemically united to the fiber by means of a —O—CH_2— linkage. It is found that under these circumstances the fatty alcohol residue exercises its water repellent action permanently.

The chlormethyl ether compounds just referred to suffer from the disadvantage (from the viewpoint of the textile processor who prefers not to use auxiliaries soluble only in organic solvents) of being water-insoluble. It was therefore a great step forward when it was discovered that they could be combined with pyridine to give products soluble in water but which on suitable heating split up so as to liberate the pyridine and the chlormethyl ether. By arranging for this decomposition to take place in the textile material being treated it is obviously possible to secure just those same results of water repellency as if the chlormethyl ether substance itself had been used without the pyridine.

This method for producing water repellency now seems comparatively simple but the discovery of the method was not simple, and so far as can be understood the real discoverers failed to see the real significance of their discovery so that it was left to others to reap the final credit. It would seem that the Deutsche Hydrierwerke (E. P. 426,482) in some investigations on products for modifying the dyeing properties of cellulose fibers (making the fibers receptive to acid dyes and also giving direct dyeings increased fastness to water) noted that when cotton was heated for a few hours at 100° C. with a solution of butyl-chlormethyl-ether in pyridine it acquired a certain degree of water-repellency. Obviously this treatment cannot be considered satisfactory from the commercial viewpoint since the cost would be prohibitive in relation to the advantages to be gained.

At this stage came the improvement of Messrs. I.C.I. by which the butyl-chlormethyl-ether was replaced by similar ethers in which the butyl was omitted in favor of other alkyl radicals of much higher molecular weight (E. P. 466,817), and the ether was also combined with pyridine to form a temporary water-soluble compound. With this was developed a special technique for applying the new auxiliaries to textile materials and so rendering them water repellent.

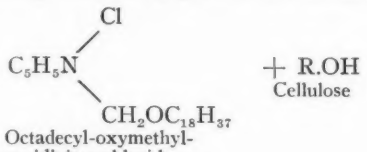
The general method of application has now been standardized as follows. The fabric is first impregnated with a ½ to 3 per cent aqueous solution of the auxiliary and is then dried under conditions such that no substantial decomposition of the auxiliary within the fabric occurs. Any such decomposition is unfavorable to permanency of the water repellent effect ultimately obtained. So far, it appears that the most favorable drying conditions are those in which the hot air in contact with the fabric is kept moving briskly. With rapidly moving air a high temperature (80° C.) can be used, but if the air is more or less stagnant then a low temperature of 40° C. must be used in drying. It is easy to understand these requirements when it is pointed out that drying of the impregnated fabric at a high temperature in slowly moving air is almost equivalent to steaming of the auxiliary within the fabric; such steaming will decompose the auxiliary for it is noticed that simple boiling of the aqueous impregnation solution is sufficient to decompose it.

Immediately after the drying, the auxiliary in its undecomposed form can be considered as being intimately and uniformly distributed throughout the fibers of the textile material. So the next stage is that of baking in which the fabric is maintained for a few minutes at the comparatively high temperature of 105 to 120° C. The exact conditions of this baking can only be established by trial but they are important since it is at this stage that the permanent character of the final water repellent effect is determined.

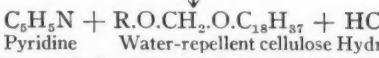
During baking the auxiliary within the fibers splits up and as shown below there is formed pyridine (this partly volatilizes) and hydrochloric acid while the alkyl ether portion chemically combines with the fiber. As is well known, pyridine has a very objectionable odor so that finally this by-product must be completely removed from

the fabric by washing. The hydrochloric acid can have a tendering action on cellulose fibers so this must be counteracted. The most convenient method for achieving this is to have present in the fabric an acid neutralizing agent. Sodium acetate is very suitable for this purpose.

The chemical structure of Velan and such compounds together with the reactions which take place in the textile material during the baking process are indicated below:

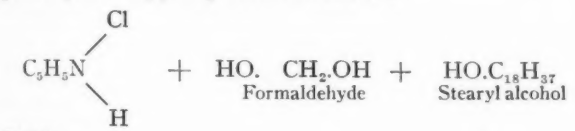


Octadecyl-oxymethyl-pyridinium chloride

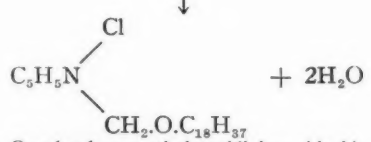


Pyridine — Water-repellent cellulose — Hydrochloric acid

The chloromethyl ethers of fatty alcohols used may be prepared separately and then applied to the textile material from solution in an organic solvent but as indicated above it is more convenient to use them in the form of their pyridinium compounds since these are water-soluble. The manufacture of such compounds is carried out by reacting together a fatty alcohol, pyridine, and paraformaldehyde in the presence of anhydrous hydrochloric acid. If the formaldehyde be assumed to add water and enter into the reaction as $CH_2(OH)_2$ and the hydrochloric acid be assumed to add at first to the pyridine to form pyridine hydrochloride, then the formation of the pyridinium compound (auxiliary) may occur as follows:



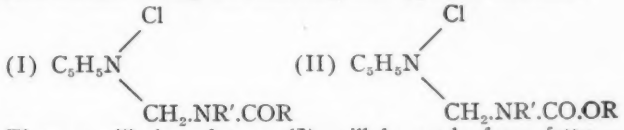
Pyridine hydrochloride — Formaldehyde — Stearyl alcohol



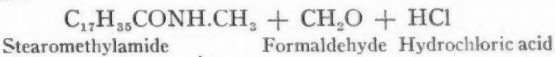
Octadecyl-oxymethyl-pyridinium chloride

Many fatty alcohols derived from natural fats and waxes have been made into pyridinium auxiliaries of this kind for use in making textile materials water-repellent. Among these may be mentioned cetyl octadecyl, and dodecyl alcohols. The auxiliaries chosen for commercial use will be selected from these and it is believed that the octadecyl compound is generally most useful.

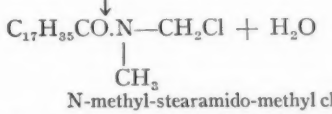
An important feature of the above compounds is that the fatty alcohol residue is joined to the pyridinium molecule by means of an oxymethyl group, —CH_2O—, but it has been found that other linking groups may be used for this purpose. To prepare these alternative compounds it may be necessary to use not the fatty alcohols but rather the fatty acid amides or fatty acid carbamic esters. In this manner pyridinium water-repellent auxiliaries have been formed having the following two types of structure:



Those auxiliaries of type (I) will be made from fatty acid amides while those of type (II) will be prepared from the fatty carbamic esters. Paraformaldehyde is used in their manufacture. For example, in preparing N-methyl-stearamido-methyl chloride (ready for combination with pyridine to form the pyridinium auxiliary), stearomethylamide is reacted with paraformaldehyde and hydrochloric acid in benzene solution whereby the following changes occur:

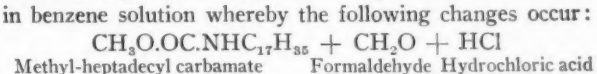


Stearomethylamide — Formaldehyde — Hydrochloric acid

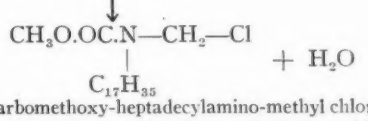


N-methyl-stearamido-methyl chloride

In much the same manner N-carbomethyoxy-haptadecyl-amino-methyl chloride is made from methylheptadecyl carbamate, paraformaldehyde, and hydrochloric acid also in benzene solution whereby the following changes occur:

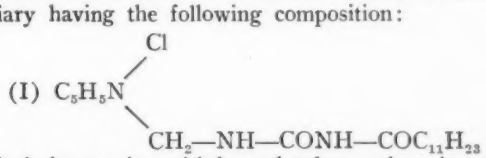


Methyl-heptadecyl carbamate — Formaldehyde — Hydrochloric acid

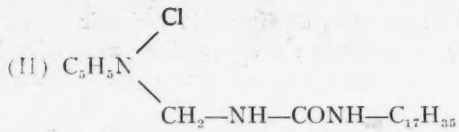


N-carbomethoxy-heptadecylamino-methyl chloride

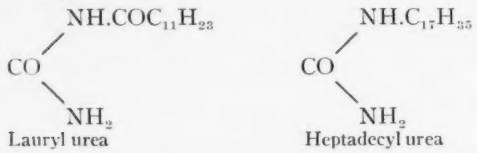
It may be noted that the fatty alcohol residue in the above compounds does not form part of an ether as in the original Velan auxiliary, but at the same time it is fairly close to the pyridine nucleus being only separated therefrom by a —N—CH_2— or a —CO—N—CH_2— group. There is however the possibility of making these water repellent auxiliaries from complex urea derivatives in which the fatty alcohol residue is situated at the remote end and is thus far removed from the pyridine nucleus. These compounds are made by the same type of reaction in which the urea derivative is heated together with paraformaldehyde and hydrochloric acid, but by also having present the pyridine the complete pyridinium compound can be directly formed. Thus by starting with lauryl urea there results quite a formidable looking pyridinium auxiliary having the following composition:



Similarly by starting with heptadecyl urea there is a somewhat similar auxiliary as shown below:



The difference between auxiliaries (I) and (II) is due to the difference in the substituted ureas used as starting substances. Thus the lauryl urea which is the basis of (I) is the result of condensation of lauric acid (its acid chloride) with urea, whereas the heptadecyl urea from which (II) is produced is an alkyl substituted urea; the difference between these two substituted ureas is shown by the following formulae and these should be compared with the formulae given for the pyridinium corresponding auxiliaries given above.



Lauryl urea

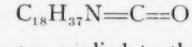
Heptadecyl urea

All the above pyridinium auxiliaries are applied to textile materials by the method already described. First there is the padding, then the drying so as to avoid premature decomposition, and lastly the baking by which the fatty alcohol residue is chemically fixed to the fiber to give a water repellent effect which is fast to both washing and dry cleaning.

The reason for preparing so many compounds of this type is that it is hoped to discover auxiliaries which have better stability in solution and which have a reduced tendency to decompose in the drying stage.

Before leaving this field in which fatty derivatives are used for producing water repellency it will be interesting to refer to yet two other types of auxiliary which are less closely related. The first type is that in which the fatty residue forms part of the molecule of an organic isocyanate. For some time it has been known that cellulose is able to react with isocyanates to form a carbamic ester and lately it has been found that when the isocyanate contains a high molecular weight alkyl group the treated cellulose fiber acquires water-repellent properties.

Suitable isocyanate auxiliaries include decyl-, hexadecyl-, and octadecyl- isocyanates. The last named compound has the following chemical structure which is characteristic for them all:



These auxiliaries are applied to the cotton or cellulose rayon from solution in an organic solvent such as benzine. For example cotton fabric may be padded with a ½ per cent solution of heptacosyl isocyanate, $C_{27}H_{55}NCO$, in benzine; the benzine is then evaporated off and the fabric heated for two minutes at 150° C. Cotton treated in this manner becomes thoroughly water repellent and even acquires greater durability in wear.

(To be concluded)

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